NRRI Collection of Miscellaneous Reports

Pt. 2

Natural Resources Research
Institute University of Minnesota
5013 Miller Trunk Highway
Duluth, MN 55811-1442

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A

State of Minnesota *BaseMap* '98

"A basic core of geography that provides users a means to relate their spatial data to other spatial data."

Minnesota Department of Transportation
Office of Land Management
Surveying and Mapping Section
Geographic Information and Mapping Unit
BaseMap Development Group

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BaseMap Development

BaseMap was developed to fill a need at Mn/DOT for a continuous, statewide GIS base map. *BaseMap* is the product of a number of efforts, including standards committees, user group meetings, and pilot projects, as well as the GIS Specialists who worked to digitize and build it.

BaseMap allows users to display and analyze data from many sources and in any of several location-reference systems. It is under continuous development and it will be enhanced and maintained by Mn/DOT. A current version will be published yearly.

Comments from YOU are welcome. The purpose of *BaseMap* is to fill your needs. Please let us know how we are doing by filling out the feedback form (FEEDBACK.WRI) or by e-mail at gisinfo@dot.state.mn.us or call (612) 215-1973.

Although we endeavored to make *BaseMap* current and complete, there are known limitations that have not been resolved for this release. Therefore, a document (INFO.WRI) outlining these limitations has been included.

Reading *BaseMap* Files

BaseMap is stored as Arc/Info workstation coverages on CD-ROM. This format can be read by workstation Arc/Info version 7.x, ArcView version 2.x or later, and several others. It cannot be read by ArcView 1.0 or Intergraph MGE.

BaseMap data can be read directly from the CD-ROM or can be copied directly to the user's hard disk. Care should be taken when copying the coverages to avoid overwriting previously copied coverages, particularly INFO

subdirectories.

III

***BaseMap* History**

In the late 1970s, the Minnesota Department of Transportation (Mn/DOT) invested in Computer Assisted Drafting and Design (CADD) systems to automate drafting. This technology allowed for easy updating and manipulating of digital files. Soon after, Mn/DOT's Cartographic Unit used CADD to create many of their cartographic products.

In the late 1980s Geographic Information Systems (GIS) popularity exploded. Mn/DOT researched the usefulness of this technology. They found that GIS would greatly enhance many of the services Mn/DOT performs. In addition they found the price of GIS software and computers to run it affordable. They also realized that to implement this tool they would need a digital, intermediate scaled, state-wide base map to display the department's data. Since the Cartographic Unit had already begun digitizing the United States Geological Survey (USGS) 7.5 minute quadrangles to support the County Mapping Series, it was the logical choice for this project.

In 1989 the Cartographic Unit consulted Land Management Information Center (LMIC) and the USGS regarding digitizing methods for GIS purposes. By 1992 thirty-five percent of the base map was complete. At that pace the base map was ten to twelve years away from completion. It was evident that the digitizing process must be expedited. At the August 27, 1992 meeting of Mn/DOT's Council for Geographic Information, a GIS Base Map Task Force was formed. The task force was charged to analyze the current 1:24,000 scale digital state-wide map being created in the Cartographic Unit and to make recommendations on how to complete this effort in a 1-2 year time frame. Several different methods of digitally recreating the quadrangles were studied. The Task Force report recommended an accelerated, in-house, manual digitizing program as the best choice.

In March 1993, the Cartographic Unit began the accelerated mapping program to complete the charge laid out by the GIS Base Map Task Force. Most of the Cartographic Unit's resources focused on this task. For eighteen months many cartographic projects were suspended while the 1745 quadrangles were completed. The Cartographic Unit then shifted its focus back to the creation of cartographic products while a core group was left to complete the base map. This group became the BaseMap Development Group.

Although all 1745 quadrangles were now in digital form, one third were digitized over a 4 year period. To provide an easier way to update the older quadrangles, the *BaseMap* Development Group created seventy larger and more manageable files. They also found it necessary to project the files to a common coordinate system before merging them. They converted the files from State Plane Coordinates to Universal Transverse Mercator (UTM). This process made it possible to create seamless, state-wide GIS layers.

By the end of 1994, work began to create GIS layers from the CADD files. For this task an IBM RISC 6000/R20 (AIX Operating System), four PCs running Windows NT workstation and one Windows NT server were purchased. The GIS software chosen was Environmental System Research Institute's (ESRI) Arc/Info. Arc/Info was installed on the RISC 6000 and accessed by the PCs using X-Windows.

The next step was to convert the CADD files into Arc/Info coverages. Over the next year files were converted into Arc/Info, merged into statewide, seamless coverages, attributed, routes created, and the State of Minnesota *BaseMap* became a reality.

IV

***BaseMap* Themes**

BaseMap is divided into a number of coverages or themes. The themes fall into several broad categories, such as Transportation system. A brief description of each theme follows.

Transportation system

Trunk highway system - RDWY SIZE - 3.4 **(in MB)**
Includes Interstate, US trunk highway, and Minnesota trunk highway system roadway centerlines. The roadway geometry includes divided roadways. This theme uses the dynamic segmentation route model to allow users to display and analyze data with route-reference locations. Two route systems are used. The RDWY (roadway) route system provides directional location on all routes by designating an increasing and decreasing direction of travel. The HWY (highway) route system provides a single location, regardless of direction of travel. Each of the two route systems uses the trunk highway name, i.e. MN7, US12, I35E. The RDWY system appends a -I for increasing direction or a -D for decreasing direction, i.e. MN7-I, US12-D, I35E-I. Distance measurements are in miles (true mileage) from the beginning point.

Simplified trunk highway system - HWY SIZE - 2.6
Includes Interstate, US trunk highway, and Minnesota trunk highway system highway centerlines. Highway geometry is simplified to single centerlines for divided roadways. Uses the dynamic segmentation route model to allow users to display and analyze data with route-reference locations. The HWY (highway) route system provides a single location, regardless of direction of travel. The route systems use the trunk highway name, i.e. MN7, US12, I35E, and a distance measure in miles (true mileage) from the beginning point.

Ramps (trunk highway system) - RAMPS SIZE - .610
Includes ramps, loops, and collector-distributor roadway centerlines. This theme does not name these features, nor does it provide a linear reference system.

County state-aid highways - CSAH SIZE - 8.5
County state-aid highway (CSAH) is a category of highways based on funding designation. This theme also uses the dynamic segmentation route model. The route system is HWY (highway) and does not provide a directional (RDWY) system. CSAH highways are designated with a county number and a name (usually numeric).

County roads - CNTYROAD SIZE - 2.6
County highways are included, but are not yet named, although they are updated to reflect 1995 county information.

Township roads - TWPROAD SIZE - 17.6
Township roads are included, but are not yet named.

City streets (non-designated roads) - CITYST SIZE - 13.25
City streets are included, but are not yet named. Address ranges are also desirable, but no resources are identified to provide this.

Railroads - RAILROAD SIZE - .630
Railroads are included, but are not yet named, although they are updated to reflect 1995 railroad information.

Airport runways - RUNWAYS SIZE - .030
Runway outlines are included, but airport names and runway designations are not.

Civil and political boundaries
County boundaries - COUNTY SIZE - .950
Minnesota county boundaries are shape or polygon features. This theme uses the polygon data model and includes a label for each of the counties. The counties are named (in mixed case) and are also designated by county number and Federal Information Processing Standards (FIPS) code.

Corporate limits (incorporated areas) - MUNI SIZE - 3.0
Municipal or incorporated areas within Minnesota are included in this theme. The region data model is used because many incorporated areas are not contiguous. The areas are named (in mixed case) and are also designated by FIPS code.

Parks - PARK SIZE - .580
Includes regional, state and federal parks. This theme shows park boundaries as lines. Names are not included.

Forests - FOREST SIZE - 1.2
Includes state and federal forest boundaries. This theme uses the region data model. Forest names (in mixed case), state forest tags (SFT), and national region/forest numbers are designated.

Indian reservations - RESERVTN SIZE - .880
Indian reservation boundaries use the region data model. Reservations are named (in mixed case).

Military reservation - MILITARY SIZE - .110
Military reservation boundaries use the polygon data model. They are named (in mixed case).

Game refuges, wildlife and waterfowl areas - WILDLIFE SIZE - 3.3
Game refuges, wildlife refuges, and waterfowl production areas are included as boundary lines. Names are not included.

Public Land Survey System - PLSS SIZE - 9.8
Includes civil and congressional township boundaries, section lines and county boundaries. This theme uses the line data models and includes the name of each line type.

Section corners - CORNERS SIZE - 12.3
This theme uses the point data model and does not include names.

Section lines - SECTION SIZE - 5.96
This theme uses the line data models and does not include names.

Townships - TOWNSHIP SIZE - 9.9
This theme uses the line data models and does not include names.

State Boundary - STATE SIZE - .770
Minnesota state boundary is a shape or polygon feature. This theme uses the polygon data model and is designated by state name and FIPS code.

Surface waters
Lakes - LAKES SIZE - 102.85
Includes lake and pond boundaries. This theme uses the line data model and does not include names.

Perennial streams - PEREN SIZE - 34.5
Perennial stream designations. This theme uses the line data model and does not include names.

Intermittent streams - INTER SIZE - 52.2
Intermittent stream designations. This theme uses the line data model and does not include names.

Drainage ditches - DRAIN SIZE - 7.0
Includes manmade waterways. This theme uses the line data model and does not include names.

Other
The following themes were not created from the 7.5 minute USGS quadrangle base map linework.

Mn/DOT District boundaries - DISTRICT SIZE - .310
District boundaries are polygon features. This theme uses the polygon data model and is designated by district

name.
SOURCE - Cartographics Mn/DOT District Map CADD file

Quadrangle boundaries (1:24,000) - Q024 SIZE - 3.24
Quadrangle boundaries are polygon features. This theme uses the polygon data model. It includes a label and has several other fields designated by LMIC.
SOURCE - LMIC

Quadrangle boundaries (1:100,000) - Q100 SIZE - .720
Quadrangle boundaries are polygon features. This theme uses the polygon data model. It includes a label and has several other fields designated by LMIC.
SOURCE - LMIC

Quadrangle boundaries (1:250,000) - Q250 SIZE - .560
Quadrangle boundaries are polygon features. This theme uses the polygon data model. It includes a label and has several other fields designated by LMIC.
SOURCE - LMIC

City place names - CITYNAME SIZE - .120
This theme uses the point data model. The points are named (in mixed case) and have population data from the 1990 census.
SOURCE - USGS (GNIS)

V

***BaseMap* Map Projection Information**
Projection - Universal Transverse Mercator (UTM)
Zone 15, extended east and west to include all of Minnesota
Units - meters
Datum - North American Datum 1983

Absolute positional accuracy $\pm$ 12 meters
Original scale 1:24000

VI

***BaseMap* Clipping Procedure**

Process for clipping out sections of the MN/DOT BaseMap by municipality, county or district.

Step 1
Create a view with the counties and the layers you want to clip.

Step 2
Select the county or counties that you want to create a subset for. This can be done graphically or by selecting in the attributes.

Step 3
Make the Theme you want to subset the active theme.

Step 4
Under the Theme menu click on "Select by Theme", a dialog box will appear. In the top selection box select the appropriate type of overlay. Intersect works well for linear types. In the lower box use the list to select county. Finally, click on the appropriate selection choice. This process will take a bit of time.

Step 5
Under the Theme menu click on "Convert to Shapefile...". This will convert the features you selected in step 4 to a
shape file.

That's it. You now have a shape file that matches the extent of the county or counties you desired. This process works with other polygon feature types, features can be extracted by municipality, district or project area also.

Note: Route features often extend past county boundaries. To avoid this from happening, extract by arc features. Alternately you can select by route and use the surrounding polygons as a mask.

APPENDIX A

Trademarks
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Disclaimer
The Minnesota Department of Transportation makes no representation or warranties, express or implied, with respect to the reuse of the data provided herewith, regardless of its format or the means of its transmission. There is no guarantee or representation to the user as to the accuracy, currency, suitability, or reliability of this data for any purpose. The user assumes all risks associated with its use. By acceptance of this data, the user agrees not to transmit this data or provide access to it or any part of it to another party unless the user shall include with the data a copy of this disclaimer. The Minnesota Department of Transportation assumes no responsibility for actual or consequential damage incurred as a result of any user's reliance on this data.

B

Minnesota Land Management Information Center Metadata Directory

Metadata Summary

MGC100: Statewide 100 Meter EPPL7/EPIC2000 Data Set

Originator	Minnesota Land Management Information Center (LMIC), Minnesota Planning
Abstract	MGC100 is a statewide data set that consists of approximately 400 raster-formatted data layers. It is available on CD-ROM in either EPPL7 format. The data themes cover a wide range of physical and biological variables, along with administrative, political, sociodemographic, and transportation data. The data collection unit for most of the variables is the 40-acre parcel. Files have been subdivided into 100-meter by 100-meter grid cells and spatially corrected to provide improved geographic reference. However, this processing step does not improve the original 40-acre resolution accuracy. The data set is designed for use in regional and statewide planning, not for site-specific decision making. MGC100 is effectively the MLMIS100 county data set appended into a statewide coverage.
Time Period of Content Date	
Currentness Reference	Varies by data layer
Access Constraints	The updated MGC100 data set is bundled with the EPIC2000 GIS software product, available from LMIC for $99
Use Constraints	There are no known restrictions on the use of these data. Data use should be consistent with data source, scale, and capture methods.
Browse Graphic File Name	none available
Distributor Contact Person	Ken Pekarek
Distributor Organization	Minnesota Land Management Information Center (LMIC)
Distributor Voice Phone	651-296-1201
Ordering Instructions	The updated MGC100 data set is bundled with the EPIC2000 GIS software, which is available for $99 from LMIC. Order through distribution contact.
Online Linkage	none available

Full Metadata Record

These metadata were created using the Minnesota Geographic Metadata Guidelines .

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Section 1 Identification Information

Originator Minnesota Land Management Information Center (LMIC), Minnesota Planning

Title	MGC100: Statewide 100 Meter EPPL7/EPIC2000 Data Set
Abstract	MGC100 is a statewide data set that consists of approximately 400 raster-formatted data layers. It is available on CD-ROM in either EPPL7 format. The data themes cover a wide range of physical and biological variables, along with administrative, political, sociodemographic, and transportation data. The data collection unit for most of the variables is the 40-acre parcel. Files have been subdivided into 100-meter by 100-meter grid cells and spatially corrected to provide improved geographic reference. However, this processing step does not improve the original 40-acre resolution accuracy. The data set is designed for use in regional and statewide planning, not for site-specific decision making. MGC100 is effectively the MLMIS100 county data set appended into a statewide coverage.
Purpose	MGC100 was developed in order to create a data set with the following characteristics: 1. Statewide coverage 2. Geocorrected format that permits the easy transfer of data between today's raster and vector systems 3. Alternate coordinates in Zone 15 UTM coordinates
Time Period of Content Date	
Currentness Reference	Varies by data layer
Progress	Complete
Maintenance and Update Frequency	Annually
Spatial Extent of Data	Minnesota
Bounding Coordinates	-97.25 -89.48 49.40 43.50
Place Keywords	Minnesota
Theme Keywords	Administrative Regions, Land Ownership, Public Land Survey, Agriculture, Climate, Ecological Regions, Elevation, Geology, Hydrogeology, Land Use, Vegetation, Forest Cover, Forest Health , Soils, Water, Wells, Minor Civil Divisions, Legislative and Congressional Districts, Transportation, Metropolitan Region
Theme Keyword Thesaurus	None
Access Constraints	The updated MGC100 data set is bundled with the EPIC2000 GIS software product, available from LMIC for $99
Use Constraints	There are no known restrictions on the use of these data. Data use should be consistent with data source, scale, and capture methods.
Contact Person Information	Ken Pekarek, EPPL7 Coordinator Minnesota Land Management Information Center (LMIC) 658 Cedar Street, 330 Centennial Building St. Paul, MN 55155 Phone: 651-296-1201

FAX: 651-296-1212
E-mail: eppl7@lmic.state.mn.us

Browse Graphic File Name	none available
Browse Graphic File Description	Not applicable
Associated Data Sets	For more information about the EPPL7 or EPIC software or associated data sets, see the LMIC EPPL7 Web Page at http://www.mnplan.state.mn.us/EPPL7 Users needing the ERDAS or GeoTIFF format can purchase the original MGC100 CD, which contains the data in those formats. There is also a Twin Cities Metropolitan Area, 30-meter data set (Metro30), which contains some of these layers and some higher-resolution layers. It is on the same CD set as the MGC100 data. See the Metro30 metadata for more information on data capture and data contents.

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Attribute Accuracy	Varies
Logical Consistency	Not applicable
Completeness	All Minnesota counties are complete.
Horizontal Positional Accuracy	Unknown
Vertical Positional Accuracy	Not applicable
Lineage	In 1969, the Minnesota Land Management Information System (MLMIS), then located at the University of Minnesota, began to develop the original MLMIS40 statewide database. The MLMIS40 database recorded resource characteristics for every 40-acre parcel of land in the state using the Public Land Survey (PLS) as the reference system. Data in MLMIS40 are generally from map sources that range in scale from 1:24,000 to 1:1,000,000. Much of the original data entry was done with the classic grid-cell overlay technique. Each square, or raster, represented a 40-acre parcel creating a statewide database of about 1.4 million cells. By the late 1980's, the need for more detailed data for local GIS applications led to the development of MLMIS100, a new data standard with a finer spatial resolution. The MLMIS100 county data set is the geocorrected 100-meter resolution version of the MLMIS40 statewide data set. In 1993, as part of the EPIC development project, a new data standard was created for use with raster GIS. The MGC100 (MLMIS Geocorrect 100 meter) data set was created primarily by appending all the MLMIS100 county data layers together. However, some of the MGC100 data layers are actually 40-acre resolution data that have been rescaled to 100 meters. These data layers contain the exact same information as their MLMIS40 counterparts. In some instances, MLMIS40 data layers have been converted to the MGC100 data standard by first converting the MLMIS40 layer to an 'MGC40' layer that is geocorrect, and then rescaling this layer to 100-meter data. These layers also retain the

characteristics and resolution of the original 40-acre files. Today, most new data layers are first digitized into ARC/INFO format and then converted to the MGC100 data standard at map scales that vary from 1:24,000 to 1:1,000,000.

In January 1998, the MGC100 data set was converted from NAD27 to NAD83 datum. GIS specialists and programmers from MN DNR, BWSR, and LMIC cooperatively developed a standardized conversion process. It was determined that the difference between the two datums was small enough across any arbitrary area in Minnesota that it was sufficient to shift the files by the difference between NAD27 and NAD83. This procedure was adequate for the conversion of vector data sets but it caused cell mismatches when mosaicking raster data sets. Therefore, in order to create a uniform raster data set, LMIC shifted the EPPL7 files by adjusting the file extents to a multiple of the cell size, such that the actual cell size matched the nominal one, i.e. 100-meter data was made to be exactly 100 meters, with the edge of the file on 100-meter boundaries. Next, the 100-meter data was adjusted by 2 cells (200 meters) in the y direction. There was no need to adjust the files in the x direction because the difference between NAD27 and NAD83 datums is generally less than 10 meters.

Source Scale Denominator	

Section 3 Spatial Data Organization Information - - - - - - Go back to top

Native Data Set Environment	EPPL7
Geographic Reference for Tabular Data	None
Spatial Object Type	Raster
Vendor Specific Object Types	Cell
Tiling Scheme	County

Section 4 Spatial Reference Information - - - - - - Go back to top

Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS80
Horizontal Datum	NAD83
Horizontal Units	Meters
Distance Resolution	Unknown
Altitude Datum	Not applicable
Altitude Units	Not applicable

Depth Datum	Not applicable
Depth Units	Not applicable
Cell Width	100
Cell Height	100
UTM Zone Number	15E
Coordinate Offsets or Adjustments	None

Section 5 Entity and Attribute Information - - - - - - Go back to top

Entity and Attribute Overview

The MGC100 data set has been organized into thematic groups. Each thematic group contains a set of individual layers similar in their generic content. Within each thematic group, data layers depict individual attributes consistent with EPPL7 file's structure as single variable files. Some of the thematic layers are listed below.

ADMINISTRATIVE AND POLITICAL BOUNDARIES
Administrative Regions:
Counties (from Mn/DOT county highway maps)
Department of Natural Resources administrative regions
U.S. Geological Survey quadrangle boundaries: 1:24,000, 1:100,000, 1:250,000
Zip codes, 1995

Land Ownership:
Administering agency, Department of Natural Resources and tax forfeit land, 1992
Basic ownership, 1983 (federal, state, county, private)
Department of Natural Resources ownership, 1992
Public ownership, 1983

Public Land Survey:
Township numbers, range numbers, section numbers, 40-acre parcel, townships

PHYSICAL AND BIOLOGICAL
Agricultural:
Cropland potential productivity, 1979

Climate:
Average precipitation: annual, monthly and growing season (May-September)
Average temperature: annual, monthly and seasonal
Frost: first fall, last spring
Growing degree and heating degree days, growing season
National Weather Service data zones
U.S. Forest Service homoclimes, 1984
Water balance: evapotranspiration, runoff, Palmer Index (8/12/95), shortfall (1987-89)

Ecological Regions:
Aquatic Ecoregions, MPCA, from Omernik, USEPA
Ecological biomes (coniferous, deciduous, prairie)
Ecological Classification System: provinces, sections and 1995 subsections

Elevation:
Elevation, aspect, slope (all derived from 1:250,000-scale U.S. Geological Survey Digital Elevation Models)

Geology and Hydrogeology:
Aquifer materials (modeled data)
Bedrock Geology
Bedrock Hydrogeology
Depth to bedrock (includes rock outcrops)
Geomorphic regions
Ground water susceptibility to pollution (modeled data))
Quaternary geology
Quaternary Hydrogeology
Recharge potential (modeled data)

Land Use:
Land use, 1969

Vegetation:
Forest cover, 1977 and 1990
Forest cover from Landsat imagery for Department of Natural Resources Region 6 (7 county metropolitan area)
Forest health: aspen defoliator complex, blowdown, fall defoliator complex, forest tent caterpillar, gypsy moth, introduced pine sawfly, jack pine budworm, larch sawfly, large aspen tortrix, oak wilt, spruce budworm, variable oak leaf caterpillar, and white pine blister rust.
Minnesota Society of Arboriculture tree rating zones
Native tree ranges: 90 different species
Presettlement vegetation (Marschner map)
Public land survey bearing trees
Vegetative zones: 7 categories
USDA hardiness zones, 1990

Soils:
Minnesota Soils Atlas information: acidic soil, available phosphorus and potassium, available water to depth of five feet, depth to bedrock (does not include rock outcrops), drainage class, erodibility (K-factor), hydrologic groups, landform description, landscape position, permeability rate, pH, shrink-swell potential, slope class, soil type, texture
Nonatlas sources: engineering class, flood potential, sedimentation, water erosion, wind erosion
Pollution Control Agency data: soil materials, vadose zone materials (modeled data)

Water:
Major and minor watersheds
Proximity to water
Rivers (U.S. Geological Survey, line data)
USGS Hydrologic Unit Codes (2-digit and 4-digit)
Wells (location, depth, use type) from MGS County Well Index

SOCIODEMOGRAPHIC
1990 Census: minor civil divisions and tracts
Federal congressional districts, 1994
State Senate and legislative districts, 1990
School districts, 1990 and 1995-96

TRANSPORTATION
Interstate highways (line data)
Proximity to highways
State highways (U.S. Geological Survey, line data)

Entity and Attribute Detailed Citation

'MGC100 Data Documentation', formerly called 'Data Documentation for 40-Acre and 100-Meter Data for Use with EPPL7 on IBM PCs, PS/2s, or Compatibles'. Land Management Information Center, Minnesota Planning. 1996.

The 'MGC100 Data Documentation' can be printed from the following website: http://www.mnplan.state.mn.us/EPPL7

MGC100 data users are encouraged to obtain a copy of 'MGC100: Revisiting MLMIS40 Raster Data in 16-bit', by Thomas G. Eiber, Les Maki, and Ken Pekarek. This paper was presented at the 1996 Minnesota GIS/LIS Conference held September 25-27, 1996 in St. Louis Park, MN. A copy of this paper may be obtained by contacting Ken Pekarek - EPPL7 Coordinator: eppl7@LMIC.state.mn.us or call 651-296-1201

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Publisher Minnesota Land Management Information Center (LMIC), Minnesota Planning

Publication Date 10/15/1999

Contact Person Information

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Distributor's Data Set Identifier MGC100

Distribution Liability

Limitations: Although extensive effort has been made to produce error free and complete data, all geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. You should consult available data documentation (metadata) for these particular data to determine their limitations and the precision to which they depict distance, direction, location or other geographic characteristics. These data may be subject to periodic change without prior notification.

No Warranty: These data are provided as is, without any warranty whatsoever, including but not limited to any warranty as to their performance, merchantability, or fitness for any particular purpose.

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Data Delivered on Electronic Media: If these data have been requested from LMIC on magnetic media, CD-ROM or any other physical media, LMIC will deliver this product in the computer-readable format agreed upon with the requestor. LMIC will re-issue these data if they are determined unreadable by correctly adjusted computer input devices, or when the medium is delivered in a damaged condition. Requests for re-issue of this digital data product must be made within 30 days of the date shipped from LMIC.

Transfer Format Name	EPPL7
Transfer Format Version Number	3.0
Transfer Size	Software + mgc100 data + metro30 data is on 2 CD-ROMS
Ordering Instructions	The updated MGC100 data set is bundled with the EPIC2000 GIS software, which is available for $99 from LMIC. Order through distribution contact.
Online Linkage	none available

Section 7 Metadata Reference Information - - - - - - Go back to top

Metadata Date	12/03/1999
Contact Person Information	Susanne Maeder, Research Analyst Minnesota Land Management Information Center (LMIC) 658 Cedar Street, 330 Centennial Building St. Paul, MN 55155 Phone: 651-296-1211 FAX: 651-296-1212 E-mail: clearinghouse@mnplan.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.2
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

This page last updated 12/03/1999.

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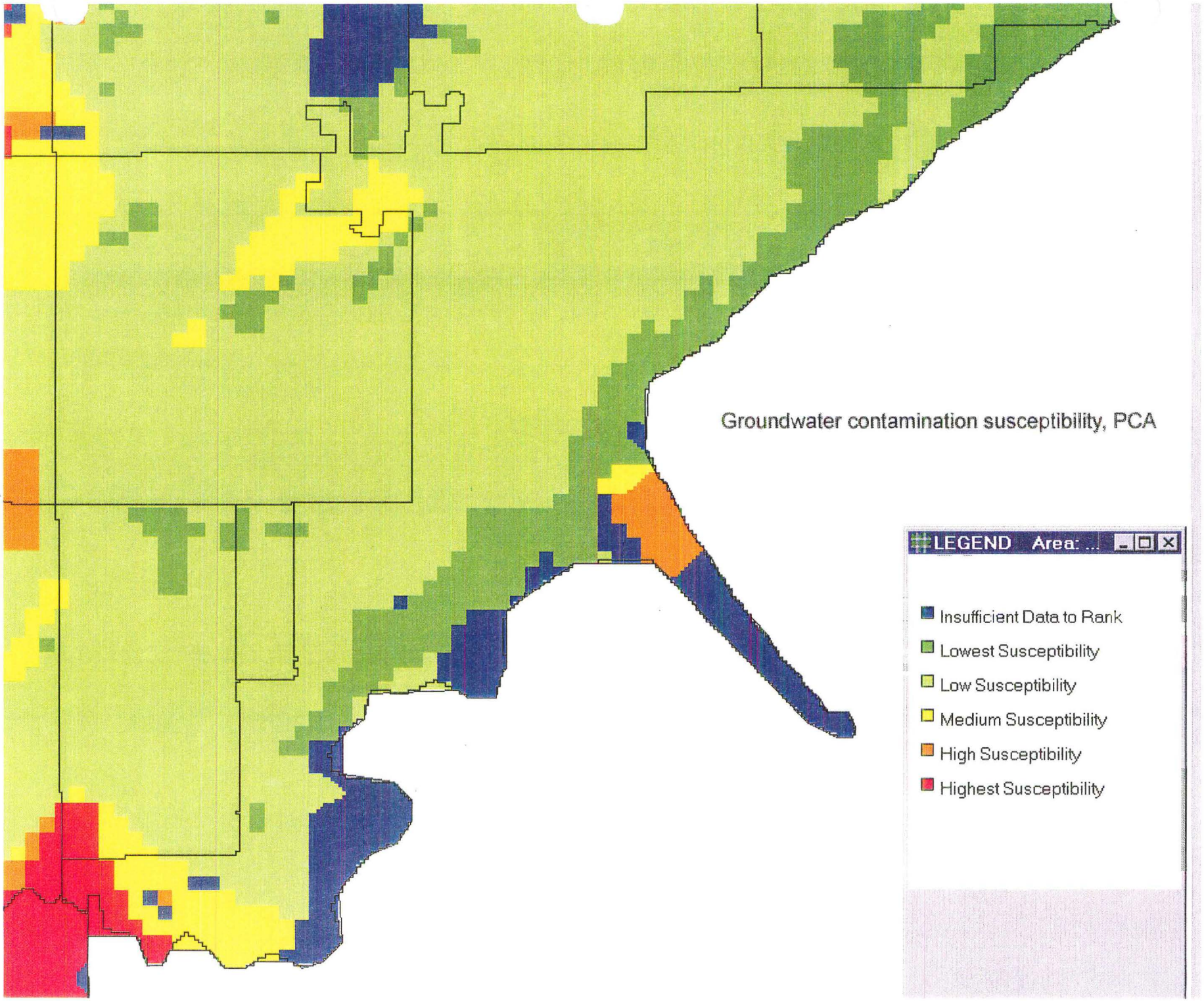

MLMIS 100 EXAMPLE

30 Meter
Digital Elevation Model

Municipal Boundaries

Duluth

Dem30im3

- 531 - 619
- 620 - 707
- 708 - 796
- 797 - 884
- 885 - 973
- 974 - 1061
- 1062 - 1150
- 1151 - 1238
- 1239 - 1327
- 1328 - 1415
- 1416 - 1503
- 1504 - 1592
- 1593 - 1680
- 1681 - 1769
- 1770 - 1857
- 1858 - 1946
- 1947 - 2034
- 2035 - 2123
- 2124 - 2211
- 2212 - 2300
- No Data

5 0 5 10 Kilometers

- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

U.S. Geological Survey

30 Meter Digital Elevation Model

This page last update: 02/10/2000 3:08:23 PM
metadata created using Minnesota Geographic Metadata Guidelines .

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Section 1	*Identification Information* - - - - - *top*
Originator	U.S. Geological Survey
Title	30 Meter Digital Elevation Model
System Name	dem30im3
Abstract	A digital elevation model (DEM) product produced at a 30 meter sampling interval using a variety of production processes. Data have been converted from the original USGS DEM format to ARC GRID .
Purpose	Landscape analysis, hillshade generation for cartographic products, slope determination
Time Period of Content Date	Unknown
Currentness Reference	The dates of source aerial photography have not been researched at this time. Date information will be added to this description when it becomes available.
Progress	Complete
Maintenance and Update Frequency	None planned
Spatial Extent of Data	Statewide coverage is available with the exception of low relief areas in the Red River Valley. A h
Bounding Coordinates	E = -89 W = -97.5 N = 49.5 S = 43
Place Keywords	Minnesota
Theme Keywords	Digital Elevation Models, DEM, Topography

Theme Keyword Thesaurus	None
Access Constraints	None
Use Constraints	None
Contact Person Information	Tim Loesch, GIS Application Coordinator DNR-MIS 500 Lafayette Road St. Paul, MN 55155-4011 Phone: (651) 296-0654 FAX: (651) 297-4946 E-mail: tim.loesch@dnr.state.mn.us
Browse Graphic File Name	dem30im3_sam.gif
Browse Graphic File Description	
Associated Data Sets	The DEM was produced by the USGS in concert with the development of other data sets in their product line. The Minnesota DEM's are closely allied with the Digital Orthophotoquad product currently under development at the USGS, which is being distributed during 1995-1996. These products should register well, although they exist at different spatial resolutions (30 meters versus 1 meter).

Section 2 *Data Quality Information* - - - - - *top*

Attribute Accuracy	The data does not carry attributes separate from elevation, which are characterized in the Vertical Positional Accuracy Section.
Logical Consistency	The data exists within a consistent data structure consistent with ARC GRID requirements.
Completeness	Complete coverage exists with the exception of low-relief areas in northwestern Minnesota
Horizontal Positional Accuracy	Unknown
Vertical Positional Accuracy	Vertical accuracy specifications for dem DEM data depend on the production methodology, photogrammetric source, and degree of editing. A vertical RMSE of 7 meters or less is the desired accuracy standard. A RMSE of 15 meters is the maximum permitted. Distinct north-south tonal banding is visible in quads with larger RMSE's. This data noise becomes especially prevalent in derived products, such as hillshades, aspect, and slope layers.
Lineage	The U.S.G.S. has been designated as a lead federal agency for the collection and distribution of digital cartographic data including Digital Elevation Model (DEM) data. All DEM data are similar in logical data structure and are ordered from south to north in profiles that are ordered from east to west. Dem data in 7.5 minute units consist of regular arrays of elevations arranged horizontally on the Universal Transverse Mercator (UTM) coordinate system of NAD27. These data are stored as profiles with 30 meter spacing along and between each profile. There are four production methods for DEM data in 7.5 minute quad form. The first is the Gestalt

Photo Mapper II which is an automated photogrammetric system. Other methods include: manual profiling from photogrammetric stereomodels using stereoplotters, interpolation of the elevations from the stereomodel digitized contours, interpolation from digital line graph hypsographic and hydrographic data. Information on which method was used to develop each data set is stored with each source file, although it is not carried through the conversion process. The results of positional accuracy tests, expressed as a Root Mean Square Error (RMSE) is also stored in the source file. If any user wishes to obtain information from the source files for a particular data set, it can be obtained upon request from the Central Office GIS Lab staff. The data was originally delivered to the Land Management Information Center (LMIC) who produced a set of CD-ROMs for interim distribution purposes. LMIC delivered the CD-ROM's to the DNR MIS Bureau, who processed the original DEM format data into an ARC GRID format.

Source Scale Denominator	24000

Section 3 *Spatial Data Organization Information* - - - - - - *top*

Native Data Set Environment	ARC GRID
Geographic Reference for Tabular Data	None
Spatial Object Type	Raster
Vendor Specific Object Types	Integer Grid
Tiling Scheme	71/2 Minut

Section 4 *Spatial Reference Information* - - - - - - *top*

Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980
Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	NGVD29
Altitude Units	feet
Depth Datum	n/a
Depth Units	n/a
Cell Width	30
Cell Height	30
Latitude Resolution	0

Longitude Resolution	0
UTM Zone Number	15
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	n/a
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5 *Entity and Attribute Information - - - - - top*

Entity and Attribute Overview	Elevation values in a regular 30 meter sampling matrix
Entity and Attribute Detailed Citation	

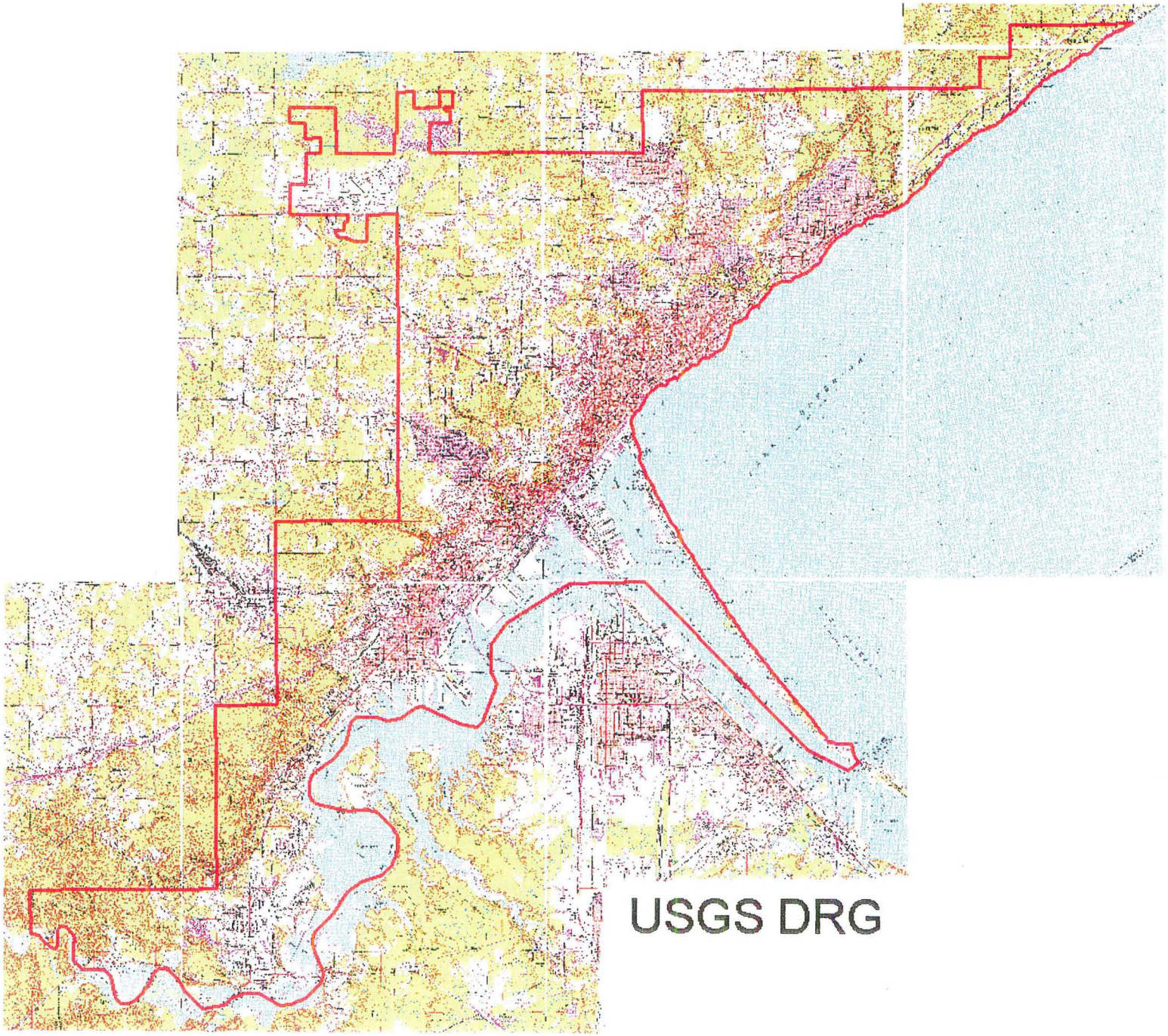
HTML Table

Section 6 *Distribution Information - - - - - - top*

Publisher	Minnesota DNR - MIS Bureau
Publication Date	2/1/1996
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	dem30im3
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO
Transfer Size	421

Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

Section 7	*Metadata Reference Information - - - - - - top*
Metadata Date	3/29/1999
Contact Person Information	Tim Loesch, GIS Applications Programmer Minnesota DNR - MIS Bureau 500 Lafayette Road St. Paul, MN 55155 Phone: 651-296-0654 FAX: 651-297-4946 E-mail: tim.loesch@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.1
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

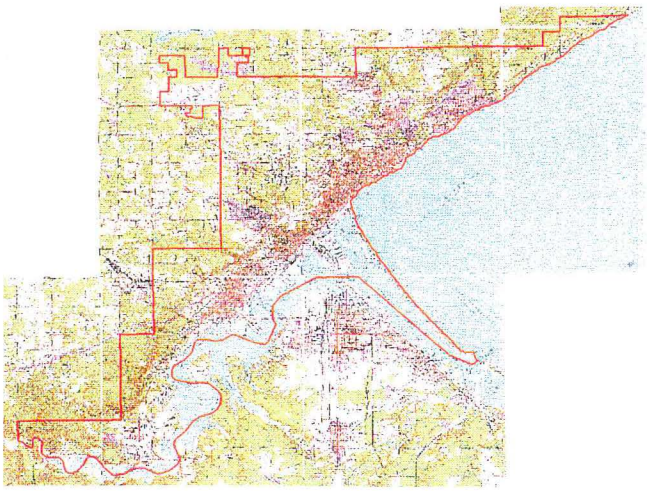


USGS DRG

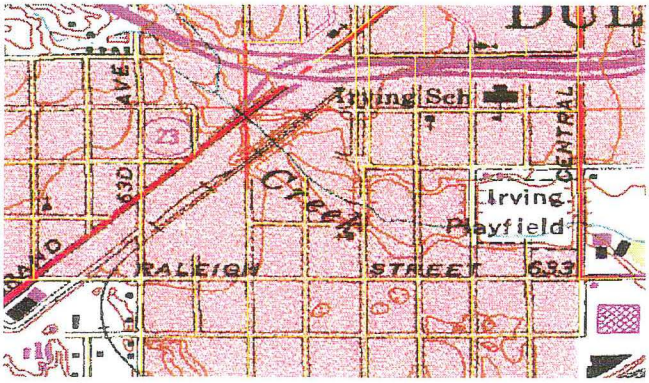
DRG

DRG's are scanned images of USGS topographic maps. A scanned DRG image includes all map collar information. The image inside the map neatline is georeferenced to the Earth's surface. DRG's are made by scanning published paper maps on high-resolution scanners at a minimum 500 dots-per-inch (dpi), resampled to 250 dpi during final processing. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection. Colors are standardized to remove scanner limitations and artifacts. The average data set size is about 8 megabytes in Tagged Image File Format (TIFF) with PackBits compression. DRG's can be easily combined with other digital cartographic products such as digital elevation models (DEM) and digital orthophoto quadrangles (DOQ).

As can be seen from this image, Duluth is covered by parts of seven DRG's.



Here is a close up look showing the DLG roads overlaying the DRG:



DRG Metadata

USGS DRG

File: README.TXT
Date: September 6, 1995

****

INTRODUCTION

This file contains the following information about the Digital Raster Graphic (DRG) products contained on this CD-ROM:

Product Liability

Description of a DRG

Displaying a DRG

Georeferencing Information

Product Specifications

****

PRODUCT LIABILITY

This CD-ROM was prepared by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof nor any of their employees make any warranty, expressed or implied, or assume any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed herein or represent that its use would not infringe privately owned rights. Reference therein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof.

Although all data published on this CD-ROM have been used by the USGS, no warranty, expressed or implied, is made by the USGS as to the accuracy of the data and related materials. The act of distribution does not constitute any such warranty, and no responsibility is assumed by the USGS in the use of these data or related materials.

****

DESCRIPTION OF A DRG

A DRG is a raster image of a published map. DRG's are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection. Colors are standardized to remove scanner limitations and artifacts. The average data set size is about 8 megabytes in Tagged Image File Format (TIFF) with PackBits compression. DRG's can be easily combined with other digital cartographic products such as digital elevation models (DEM) and digital orthophoto quadrangles (DOQ).

****

DISPLAYING A DRG

Storage, retrieval, and display of large raster data sets such as DRG's poses one of the principal design challenges for the USGS DRG program; that is, data files must remain as small as possible while preserving image quality in a public domain file format that is common to imaging and GIS software. TIFF with PackBits compression is a widely used raster file format that is very general and flexible, and many different types of files meet the standard. The extent to which the format used on this disc meets these objectives is still under evaluation.

The TIFF files on this disc can be read by either of the viewing software packages included. Both viewing packages require the coexistence of a world (.TFW) file and a data (.TIF) file in the \DATA directory to display a georeferenced DRG image. All resident files on this disc, including files in the \DATA directory are designed to be used by a DOS-based system, having the standard DOS naming convention of eight plus three (8.3) characters. If the image and world files are used on a UNIX platform, they must be renamed to adhere to the UNIX naming convention. Users operating in the UNIX environment must copy the desired image file and the associated world file to a local drive and rename them with the proper UNIX extension, as show below.

File Extension Conversion Table

File Type				
Image file:	rename	.TIF	to	.TIFF
World file:	rename	.TFW	to	.TIFW

****

GEOREFERENCING INFORMATION

The current DRG data model contains three separate types of file specific georeferencing data to provide a wide range of choices for GIS applications. These data are identified by a three-character code indicating the type of information stored in each file. File type extensions are

TIF = TIFF files with GeoTIFF tags
TFW = World file
FDG = Federal Geographic Data (Metadata)

TIFF FILES - An industry-wide standard for specifying cartographic information in TIFF tags, referred to as "GeoTIFF," has been developed by several organizations in the GIS community. These organizations include SPOT Image Corporation, NASA's Jet Propulsion Laboratory, Intergraph Corporation, Environmental Systems Research Institute (ESRI), and the USGS, among others. Geographic information is embedded in the TIFF data file in the form of descriptive tags. For detailed information about TIFF, GeoTIFF, and PackBits compression, refer to TIFF_60.TXT and GEOTIFF.TXT from the \DOCUMENT directory. The most recent versions of TIFF and GeoTIFF specifications are available via World Wide Web at

http//mcmcweb.cr.usgs.gov/

WORLD FILES - These files reside in the \DATA directory with their associated image files. World files, required for image georeferencing by the viewing software applications on this disc, contain the following information:

x resolution
amount of translation
amount of rotation
negative of the y resolution
x ground coordinate of pixel 1,1 (upper left)
y ground coordinate of pixel 1,1 (upper left)

An ARC world file is ASCII text and can be built with any text editor. ARC requires that the world file be named the same as the image file with a "W" appended. For example, if the image file is named O38077A8.TIF, the corresponding world file should be named O38077A8.TFW.

Following are the contents of the world file for the data set O38077A8.TIF (Washington West, D.C., 1:24:000 scale):

2.4
0
0

-2.4
314724.486281
4319320.265670

Ground resolution is 2.4 meters/pixel. Translation and rotation are both 0. The last two lines are the UTM values of the upper left pixel of the data set. These data are from the following locations of the metadata file:

1.2.3 SUPPLEMENTAL INFORMATION
4.1.2.4.2.1 ABSCISSA RESOLUTION (x)
4.1.2.4.2.2 ORDINATE RESOLUTION (y)
4.1.2.4.4 PLANAR DISTANCE UNITS

Many software packages are capable of displaying TIFF files without georeferencing the data. For example, when displayed using graphics arts software, the DRG is a simple picture on a computer screen.

The viewing software packages included on this CD-ROM will display DRG image files (.TIF) without the use of the world files, although, for the image file to be georeferenced, the associated world file (.TFW) must be in the same directory as the image file. If both files are located in the same directory, the image file will be displayed in UTM units.

METADATA FILES - Individual DRG data files are accompanied by metadata (data about the image) containing a wide range of information about the image data to assist the user in determining the availability, fitness, means of accessing, and transfer of the data. Metadata are also important for establishing quality control. Specific information can be extracted from metadata files and used to georeference the DRG depending on the requirements of individual raster viewing applications. Generic information about the content and composition of the metadata files on this disc can be referenced in the Metadata Template, Appendix 2-A of the "Standards for Digital Raster Graphics." A soft copy version of this Standard, DRG_STD.TXT, can be accessed and referenced from the \DOCUMENT directory. File specific metadata for each image on this disc can be found in the \METADATA directory.

****

PRODUCT SPECIFICATIONS

Source materials -

Standard series USGS paper maps or other materials that are suitable for

scanning.

Georeferencing -

The DRG's scanned raster image file is transformed to the theoretical UTM coordinate positions of the published map's grid ticks:

16 - 2.5-minute tick marks for the 1:24,000-scale series
16 - 2.5-minute tick marks for the 1:25,000-scale series
(7.5 minute x 7.5 minute series)
28 - 2.5-minute tick marks for the 1:25,000-scale series
(7.5-minute x 15-minute series)
15 - 15-minute ticks in the 1:100,000-scale series
45 - 15-minute ticks in the 1:250,000-scale series
* - 1:63,360-scale Alaska series quadrangles

* The number and spacing of ticks on the 1:63,360-scale Alaska series quadrangles vary depending on the position of the quadrangle along the longitudinal axis.

Scan resolution -

Scanned at a minimum 500 dots-per-inch (dpi), resampled to 250 dpi during final processing.

Map projection -

To be consistent with other USGS digital data, the image is cast on the UTM projection. Therefore, the projection of the DRG will not always be consistent with the credit note on the image collar.

Accuracy -

The DRG maintains the horizontal positional accuracy of the 7.5-minute source map that meets National Map Accuracy Standards (NMAS). Because it is fit to the theoretical quadrangle corners based on the UTM projection, the DRG may have distortions outside the map projection lines.

Color standardization -

Standard DRG's have a maximum of 13 indexed colors.

File format -

TIFF 6.0 with GeoTIFF 0.2, PackBits compressed. For detailed information about TIFF, GeoTIFF, and PackBits compression, refer to TIFF_60.TXT and GEOTIFF.TXT from the \DOCUMENT directory.

Metadata -

DRG metadata contain information about the content, quality, condition, and other data characteristics necessary for determining data availability, access, and fitness for use. Metadata are compliant to the Federal Geographic Data Committee, 1994, Content Standards for Digital Geospatial Metadata (June 8, 1994).

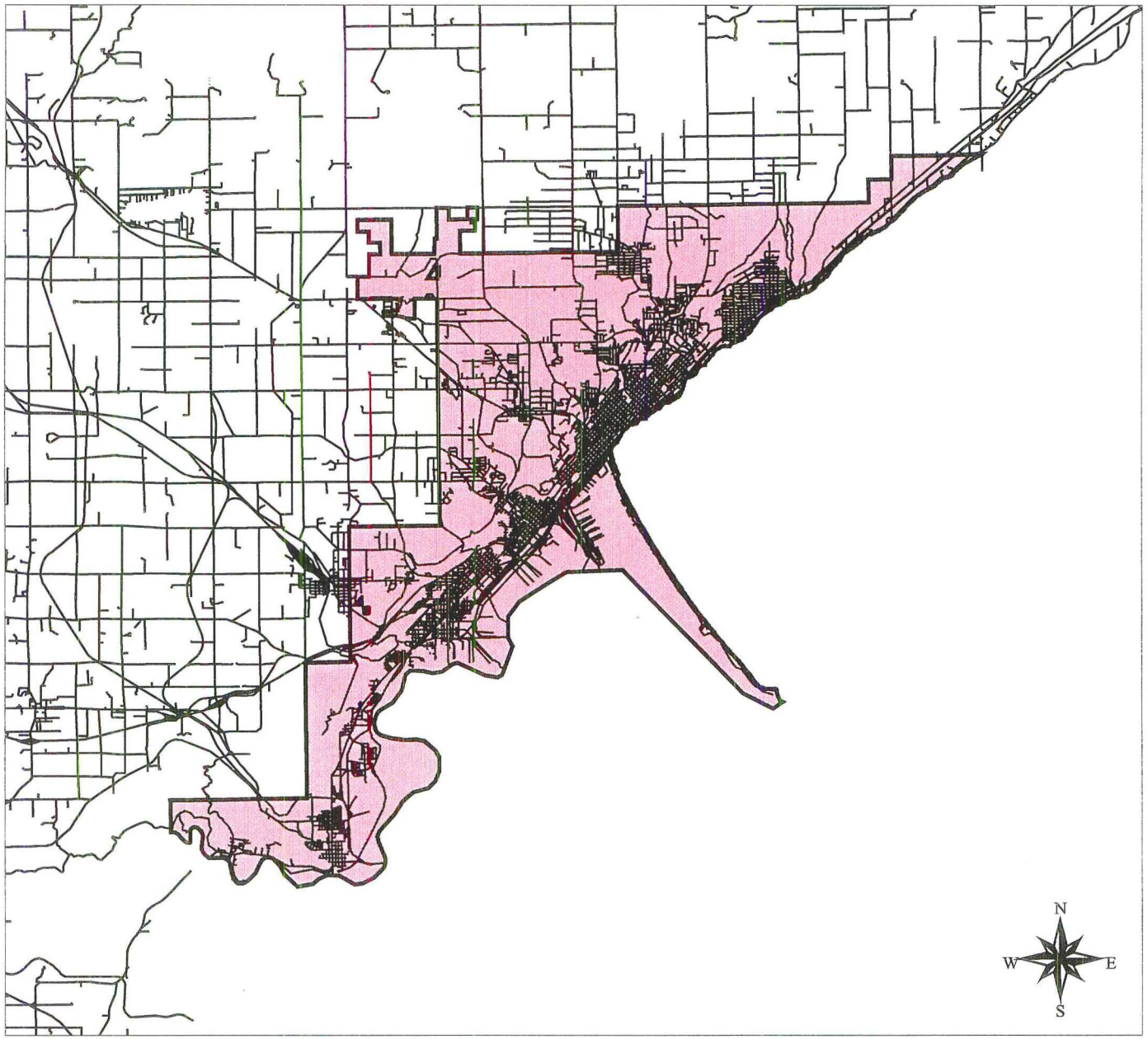
Distribution media -

DRG images of USGS quadrangles at 1:20,000-, 1:24,000-, 1:25,000-, 1:30,000-, 1:63,360-, and 1:100,000-scale are stored on CD-ROM as 1- by 1-degree cells. The associated 1:250,000-scale quadrangle comprising the cell is also included on each disc. Multiple discs may be required throughout this series to contain data within a single cell. Additional variations to the standard packaging scheme are addressed in DRG_PKG.TXT, accessible from the \DOCUMENT directory. Distribution on tape and by means of network connection may be an option in the future.

****

Tiger Roads

Tigerroads.shp
Municipal Boundaries
Duluth



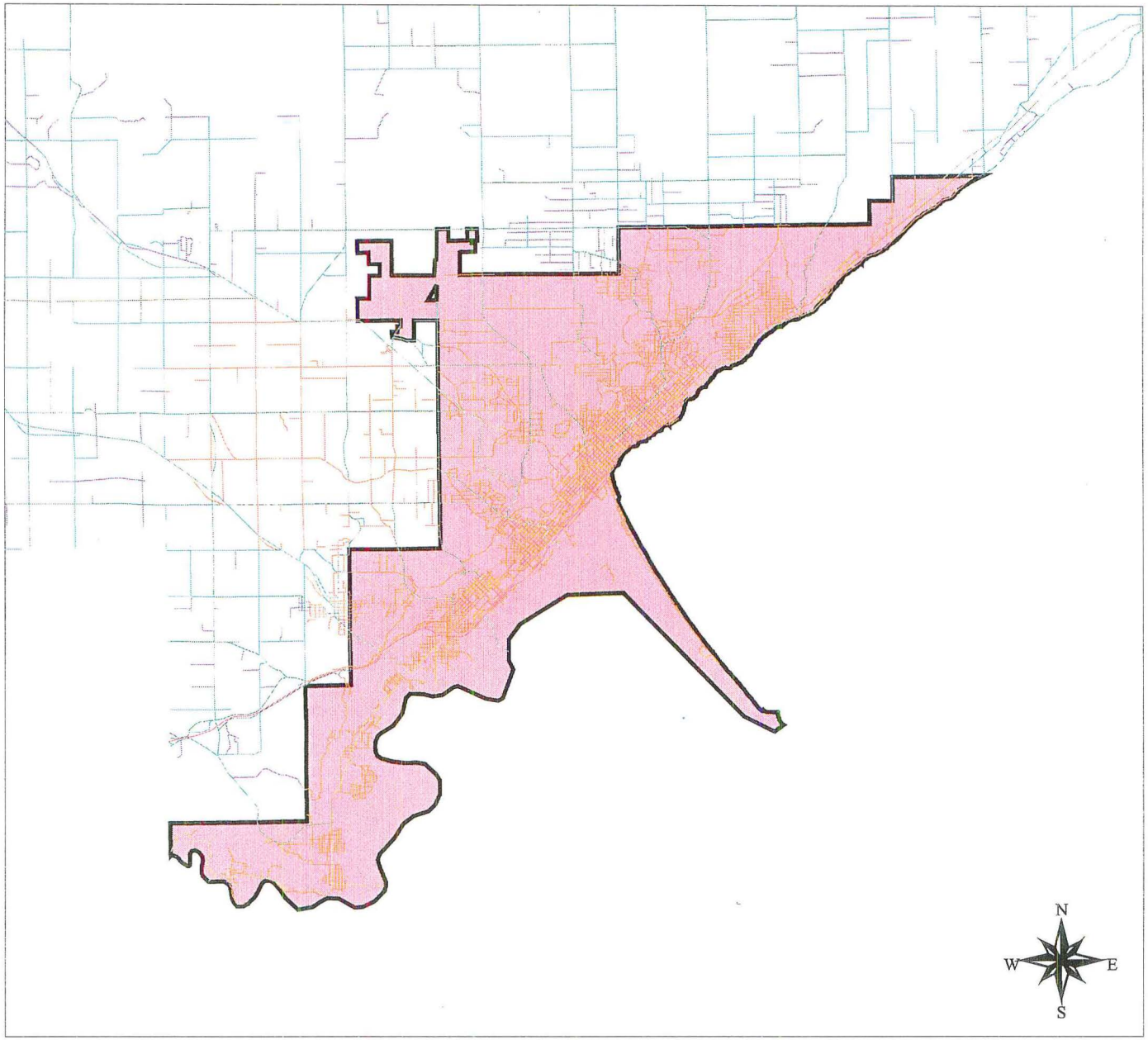
5 0 5 10 Kilometers

MNDOT Roads

- Interstate Highways
- US Trunk Highways
- Minnesota Trunk Highways
- County State Aid Highways
- County Roads
- Township Roads
- City Streets

Municipal Boundaries

- Duluth



5 0 5 10 Kilometers

- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

Minnesota Department of Transportation, Survey and Mapping

MN DOT Roads

This page last update: 02/10/2000 3:08:24 PM
metadata created using Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1	*Identification Information - - - - - - top*
Originator	Minnesota Department of Transportation, Survey and Mapping
Title	DOT Roads
System Name	dotrdln3
Abstract	This data set contains roadway centerlines for roads found on the USGS 1:24,000 mapping series. Those roadways that are Interstate, Trunk Highway, or CSAH (county state/aid Highway) are current through the 1994 construction season. All other roads are as shown on the published quadrangle.
Purpose	Basemap preparation, cartographic products, registration -control
Time Period of Content Date	1996
Currentness Reference	This data set contains roadways as digitized from 1:24,000 scale USGS quadrangles. Data for Interstates, Trunk Highways (US and STATE), and County/State Aid Higways are current through the 1994 construction season. These data contain highways names. All other roadway features are current as of the date of the published quadrangle.
Progress	complete
Maintenance and Update Frequency	yearly
Spatial Extent of Data	Statewide
Bounding Coordinates	E = -89 W = -97.5 N = 49.5 S = 43
Place Keywords	Minnesota
Theme Keywords	Roads, MnDOT, transportation

Theme Keyword Thesaurus	None
Access Constraints	none
Use Constraints	none
Contact Person Information	Tim Loesch, GIS Application Coordinator DNR-MIS 500 Lafayette Road St. Paul, MN 55155-4011 Phone: (651) 296-0654 FAX: (651) 297-4946 E-mail: tim.loesch@dnr.state.mn.us
Browse Graphic File Name	dotrdln3_sam.gif
Browse Graphic File Description	
Associated Data Sets	This data set contains features also contained in the AIDHYRT3 and MAJHYRT3 data sets. This coverage is intended to be a single source of data for roadways in Minnesota.

Section 2	*Data Quality Information - - - - - - top*
Attribute Accuracy	Unknown. Comparison to source tests were performed
Logical Consistency	Data are not topolocially consistent, in that some lines intersect, while others do not. This is principally a cartographic data product.
Completeness	Data are complete statewide, and include all road classes from residential streets to interstate highways.
Horizontal Positional Accuracy	The source maps are considered accurate to +/- 40 feet. This may served to be an approximate accuracy figure, although normal offsets introduced during the production process have not been quantified, and statistically, the true horizontal positional offsets are probably slightly larger than this.
Vertical Positional Accuracy	Not Applicable
Lineage	These data were derived from the 1996 version of the Minnesota Department of Transportation (MnDOT) Basemap product. The layer is actually a composite of all of the MnDOT roads layers into a single layer. This was accomplished using the ARC/INFO APPEND command. A single road type classification was revised and the data was reorganized to populate that field. That data were then inserted into an ARC/INFO LIBRARIAN library with a 1 degree by 1/2 degree tiling scheme.
Source Scale Denominator	24000

Section 3	*Spatial Data Organization Information - - - - - - top*
Native Data Set Environment	ARC/INFO 7.x
Geographic	none

Reference for Tabular Data	
Spatial Object Type	Vector
Vendor Specific Object Types	arc
Tiling Scheme	Q100K

Section 4	*Spatial Reference Information - - - - - - top*
Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980
Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	n/a
Altitude Units	n/a
Depth Datum	n/a
Depth Units	n/a
Cell Width	0
Cell Height	0
Latitude Resolution	0
Longitude Resolution	0
UTM Zone Number	15
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	n/a
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5	*Entity and Attribute Information - - - - - - top*
Entity and Attribute Overview	Road Lines coded for road type, including interstates, U.S. trunk highways, Minnesota trunk highways, County State Aid highways, County roads, Township roads, city streets, and ramps.

Entity and Attribute Detailed Citation HTML Table	1 FNODE# 4 5 B - - 5 TNODE# 4 5 B - - 9 LPOLY# 4 5 B - - 13 RPOLY# 4 5 B - - 17 LENGTH 8 18 F 5 - 25 DOTRDLN3# 4 5 B - - 29 DOTRDLN3-ID 4 5 B - - 33 ROAD_CLASS 2 2 I - - 35 ROAD_NUM 3 3 I - - 38 ROAD_NAME 6 6 C

Section 6	*Distribution Information - - - - - - top*
Publisher	Minnesota DNR - MIS Bureau
Publication Date	
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	dotrdln3
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO
Transfer Size	53.8
Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

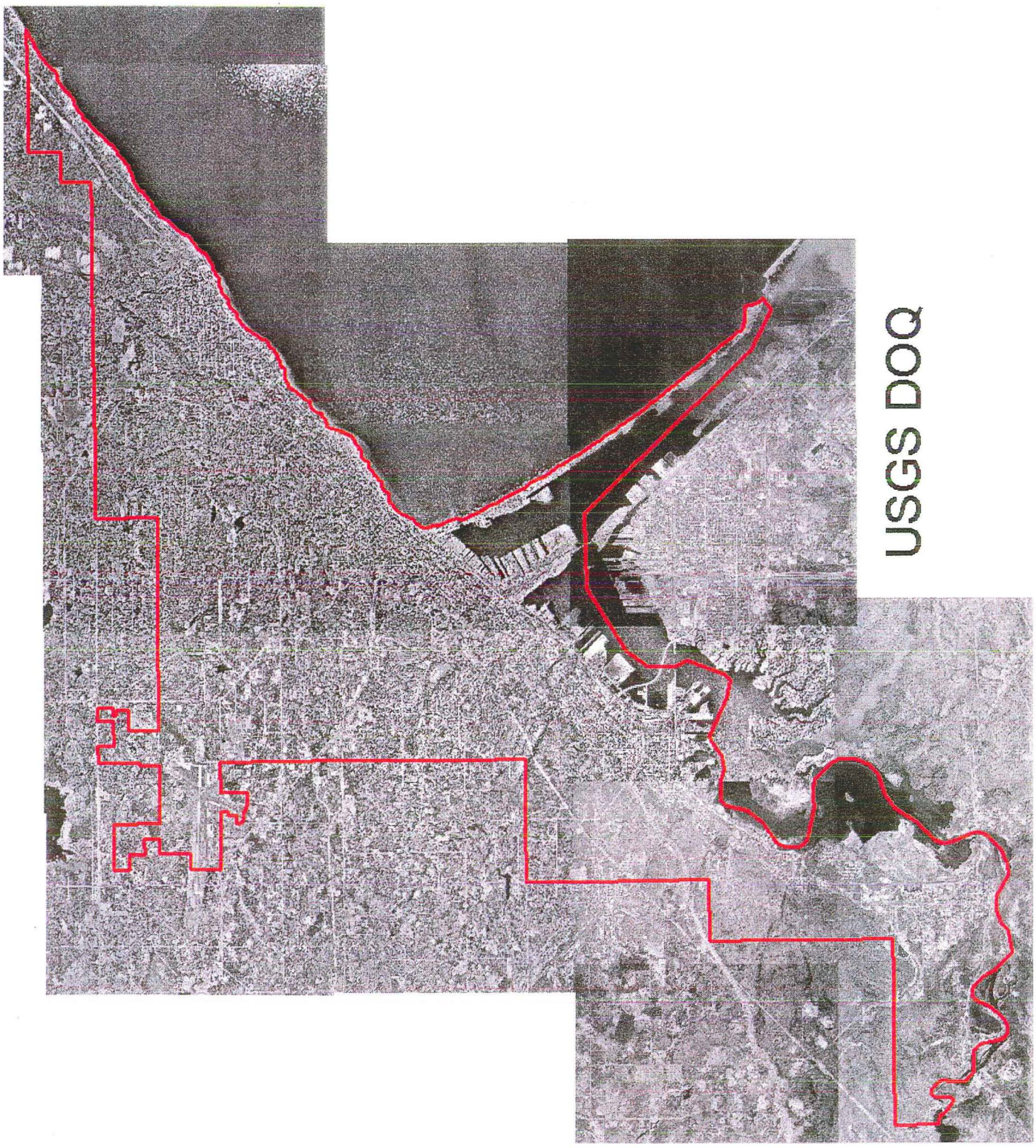
Section 7	*Metadata Reference Information - - - - - - top*
Metadata Date	3/29/1999
Contact Person Information	Tim Loesch, GIS Applications Programmer Minnesota DNR - MIS Bureau 500 Lafayette Road St. Paul, MN 55155 Phone: 651-296-0654 FAX: 651-297-4946 E-mail: tim.loesch@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard	1.1

Version

Metadata Standard Online Linkage http://www.lmic.state.mn.us/gc/stds/metadata.htm

DOT Roads

Table Name	Field Name	Begin Column	Definition	Valid Values	Description
DOTRDLN3.AAT					ARC/INFO arc attribute table
	ROAD_CLASS	33	2,2,I		A field that defines highway or surface street type
				1	Interstate Highways
				2	US Trunk Highways
				3	Minnesota Trunk Highways
				4	County State Aid Highways
				5	County Roads
				6	Township Roads
				7	City Streets
				8	Ramps
	HWY_NUM	35	6,6,I		Holds federal, state, or county highway number
				Range of values	Valid only for Road_class in (1,2,3,4)


USGS DOQ

USGS DOQ

1.1 DEFINITIONS

The term "digital orthophoto" is used throughout this document to refer to both the "digital orthophoto quadrangle" (DOQ) and "digital orthophoto quarter-quadrangle" (DOQQ) products. A digital orthophoto is a digital image which has the properties of an orthographic projection. It is derived from a digitized perspective aerial photograph by differential rectification so that image displacements caused by camera tilt and relief of terrain are removed.

Orthophoto chips - A digital orthophoto may be made up of several images which are mosaicked together to form the final image. Each separate piece of the mosaic which contributes to the final image is called a "chip".

1.2 OBJECTIVES

The U.S. Geological Survey (USGS) is designated as a lead Federal agency for the collection and distribution of digital cartographic data. The standards specified in this document pertain to the collection, processing, archive, and quality control of digital orthophoto data. Data produced to this standard will be archived in the National Digital Cartographic Data Base (NDCDB).

The U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service (ASCS); U.S. Department of Agriculture, Soil Conservation Service (SCS) and the U.S. Geological Survey, National Mapping Division (NMD) cooperate in a digital orthophoto program that meets each agency's requirements, as well as serves the broader user community for digital imagery data. The ASCS and SCS use digital orthophotos as a common base map to facilitate the collecting, organizing and sharing of natural resource data at county field offices. The NMD plans to extract digital base category data directly from digital orthophotos. This standard supports these orthophoto requirements. Given that the requirements and technologies involved in producing digital orthophotos will remain dynamic for some time, this standard outlines many of the key dependencies involved in producing digital orthophotos and, in some cases, alternative methods of production.

This document also provides USGS components with guidelines for performing quality control and acceptance of digital

orthophoto data into the NDCDB. Data generated by ASCS, SCS, and NMD, other Federal agencies, or acquired through procurement from the private sector, shall also conform to this standard, in order to be accepted for entry in the NDCDB.

1.3 PRODUCT DESCRIPTION

Orthophotos combine the image characteristics of a photograph with the geometric qualities of a map. They serve a variety of purposes, from interim maps to field references for earth science investigations and analysis. The digital orthophoto is useful as a layer of a geographic information system and as a tool for revision of digital line graphs and topographic maps. A digital orthophoto, as described in these standards, can be produced from any scale of photography. However, the program is oriented primarily toward the production of 1-meter digital orthophoto quarter-quadrangles from 1:40,000-scale National Aerial Photography Program (NAPP) or NAPP-like photography. Production of 2-meter digital orthophoto quadrangles will be primarily from National High Altitude Photography (NHAP) or NHAP-like photography (1:80,000 scale), however may be supported by the mosiacking of digital orthophoto quarter-quadrangles. At the present time, hard-copy outputs from the digital orthophotos include 1:12,000-scale orthophoto quarter-quadrangles and 1:24,000-scale orthophoto quadrangles. Image processing algorithms can be applied to the image data to support image classification, three dimensional modeling, and many other spatial applications.

The digital orthophoto is created by scanning an aerial photograph diapositive transparency with a precision image scanner. The scanned data file is then digitally rectified to an orthographic projection by processing each image pixel through photogrammetric space resection equations. This process requires, as input, ground control points acquired from ground surveys or developed in aerotriangulation, camera orientation parameters, and a digital elevation model (DEM). The rectified digital image is then archived on suitable digital storage media with informational header records inserted as the first four records of the digital image file. The image may also be written to film by a digital film writer.

1.4 SOURCES

The production procedures and instrumentation used for the collection of digital orthophotos vary depending on what systems are available. At the present time, NAPP or NAPP-like photographs are the primary source used for the production of digital orthophotos by the USGS. NAPP photographs are quarter-quadrangle centered (3.75 minutes of longitude and latitude in geographic extent) and are exposed at a flying height of 20,000 feet above mean terrain with a 152.4 millimeter focal-length camera (photography scale = 1:40,000). Quadrangle (7.5-minute) digital orthophotos are produced either by mosaicking 3.75-minute digital orthophotos or digital orthophoto chips or from NHAP. Color-infrared photographs may be used as a source for digital orthophotos; however, the digital image file is a black-and-white (B&W) digital orthophoto. Other aerial photographic or digital sources may be used in the future.

The photography is scanned at an aperture which can be adjusted between 7.5 to 60 micrometers (microns), depending upon the scanning microdensitometer and desired output ground/pixel resolution. An aperture of approximately 25 to 32 microns yields a reasonable compromise between file size and adequate image resolution to support the present digital orthophoto program requirements. A 240- by 240-millimeter (9- by 9-inch) B&W aerial photograph scanned with an aperture of 25 microns yields approximately 92 megabytes of raw data. Using 1:40,000-scale photographs, a 25-micron scan equates to a ground resolution of 1 meter. A B&W quarter-quadrangle digital orthophoto generated and cropped from a 240- by 240-millimeter photograph, scanned at 25 microns, with the requisite overedge and header records produces a rectified file of approximately 55 megabytes.

1.5 DIGITAL ORTHOPHOTO STRUCTURE AND FORMAT

The archive and distribution format of the digital orthophoto file contains four ASCII header records, followed by a series of 8-bit, binary image data records. The digital orthophoto is cast on the Universal Transverse Mercator (UTM) projection on either the North American Datum of 1927 (NAD 27) or North American Datum of 1983 (NAD 83) (See section 2.5). Digital orthophotos are archived and distributed so that when displayed on a computer graphics terminal, projection grid north is at the top.

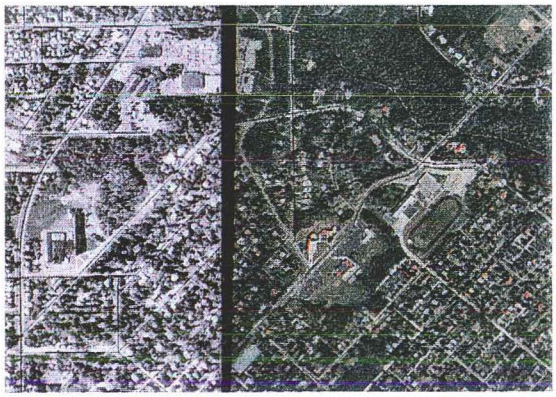
For standard 3.75-minute digital orthophotos produced by the

USGS and other Federal agencies participating under joint funding agreements and producers of digital orthophoto quarter-

quadrangles participating under cooperative agreements with the USGS, the ground/pixel resolution is 1 meter. The resolution for the 7.5-minute digital orthophotos is 2 meters. Other ground/pixel resolutions may be produced to support other image requirements.

The geographic extent of the digital orthophoto is equivalent to an orthophoto quarter-quadrangle or quadrangle (3.75 or 7.5 minutes), plus sufficient overedge coverage to encompass the four primary and secondary horizontal datum corner points. The overedge consists of a range from between a minimum of 50 meters beyond the extremes of the primary and secondary horizontal datum corner points, whichever is larger. The 300 meter overedge will be implemented by the USGS and other Federal agencies participating under Surveys, Investigations, and Research funding. The 50-300 meter overedge range standard exists to ensure that DOQs produced by entities other than the USGS meet a minimum overedge requirement. The resulting digital orthophoto is a rectangle, whose size may vary in relation to adjoining digital orthophotos. Figure 1-1 shows the relationship between the digitized image, ground control points, source DEM, source orthophoto, and 3.75- or 7.5-minute quadrangle corners. Figure 1-1 also illustrates the size difference between the scanned photograph and the digital orthophoto.

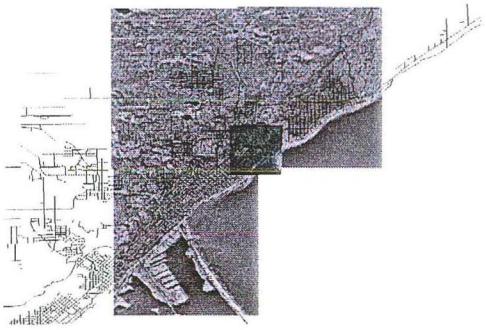
Color Aerial Photographs



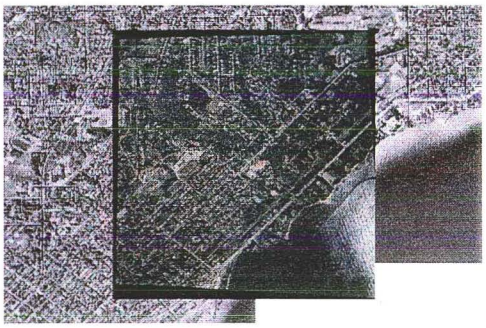
Discussion
The City currently has the 1995 standard color photos. The need for a clear, geo-rectified set of photographs should be obvious. The uses of such a set of photos would be beneficial for use in planning, zoning, engineering and perhaps even auditing. As can be seen from the example photo above, the detail is very useful when these images are scanned at high resolution. This particular image was scanned at 800 dots per inch, which resulted in a file approximately 140 MB. Obviously, storing these photos at this resolution may be a problem but there are some new compression techniques available that could potentially reduce the file sizes by a factor of fifteen to twenty. Storing files compressed would enable them to be used in a GIS such as ArcView and keep the files more manageable for less powerful computers. One particularly useful method of accessing images of this size is to store them at varying resolutions.

There are approximately 215 photos that cover the city. This is in contrast to the DNR color infra-red photos, of which there are approximately 95 photos to cover the city. The process of rectifying the photos would be time consuming and costly, yet extremely beneficial in that many city departments could use the photos as necessary.

examples of rectified image:



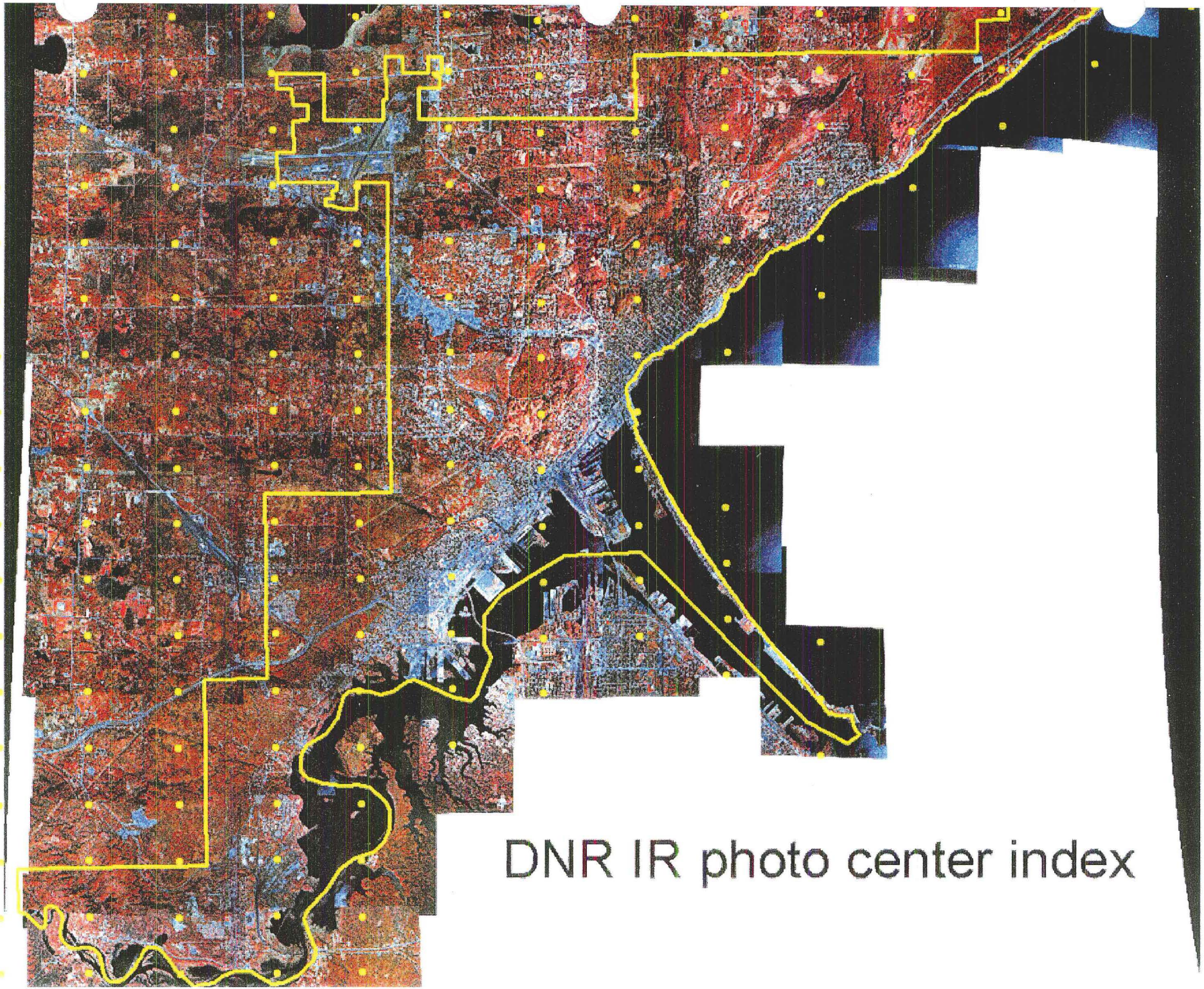
The rectified photo over a standard DOQ.



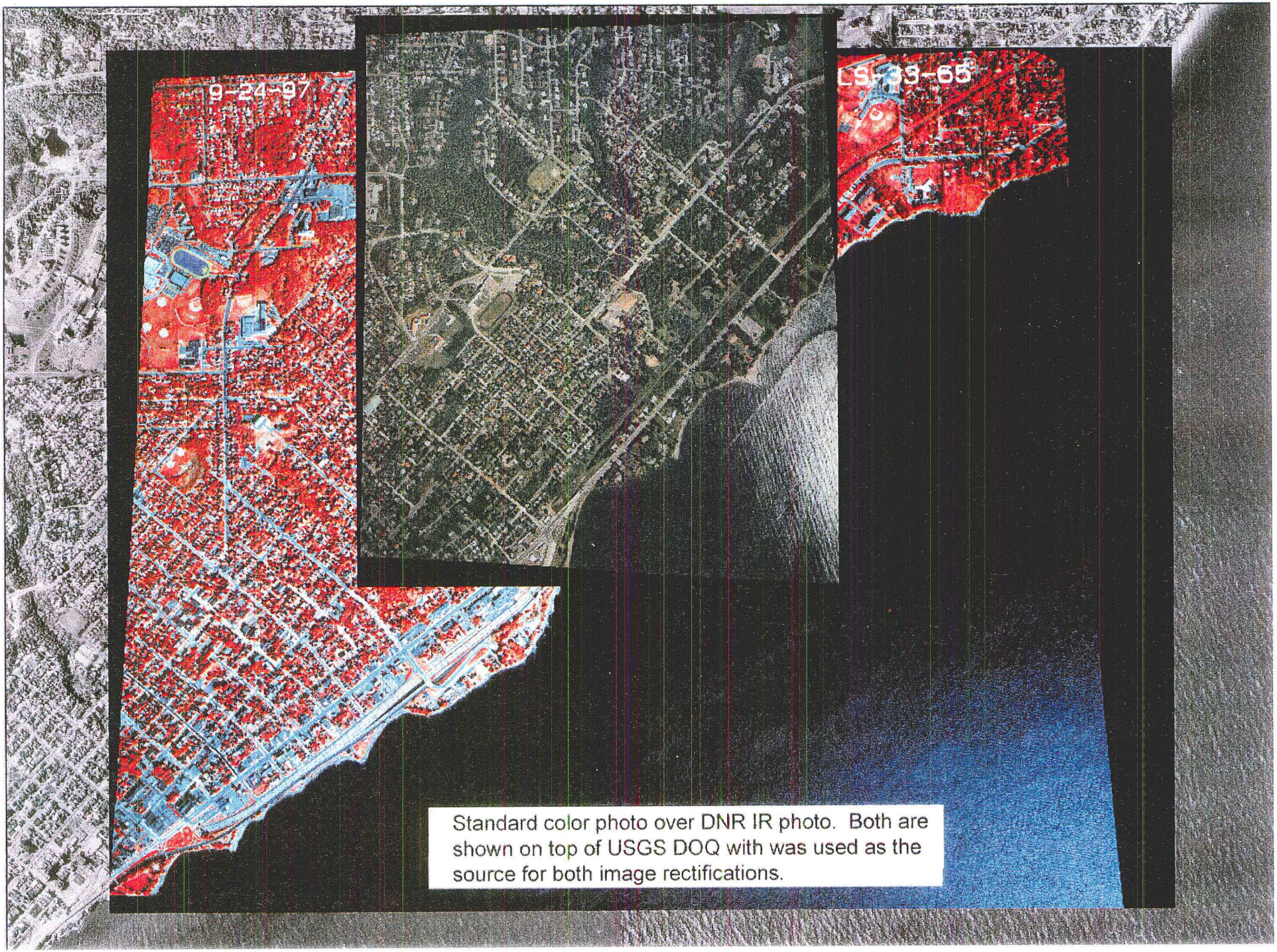
A closer look showing how well they match.

Side by side, the accuracy can be seen.

The detail is much greater than the standard DOQ.



DNR IR photo center index



Standard color photo over DNR IR photo. Both are shown on top of USGS DOQ with was used as the source for both image rectifications.

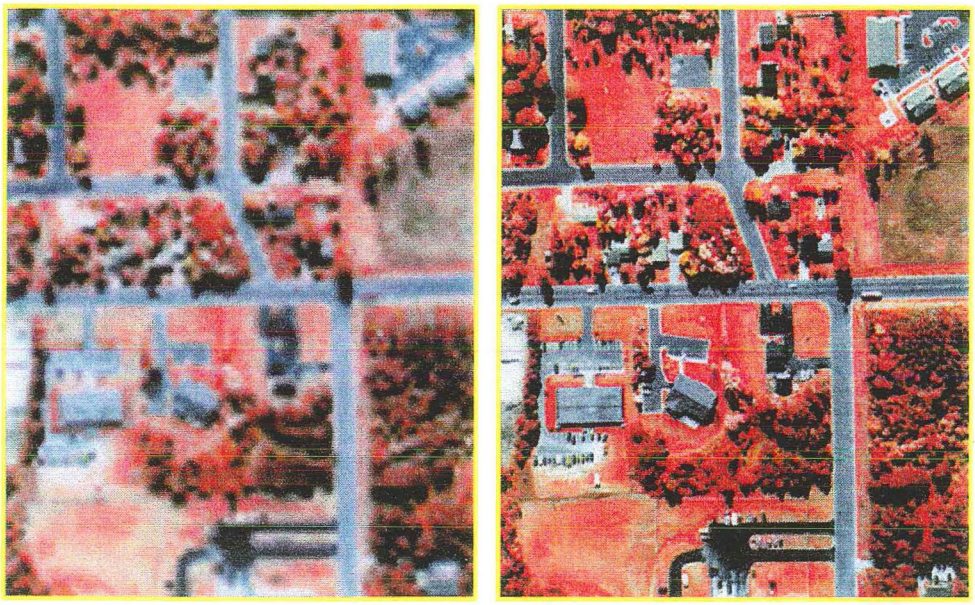
Air Photos ONLINE

DNR Air Photo Characteristics

As an aid to forest resource management efforts, DNR Forestry acquires color infrared airphotos of forested counties on a rotating basis, covering each of these counties about once every 8 years. Taken from 7900 feet above ground, the photos in their original form are highly detailed, showing individual trees, buildings and vehicles. Each covers an area about 2.25 miles square. They are taken with stereoscopic overlap for three-dimensional viewing. All are available for purchase at the original size of 9"x9", and as enlargements up to 36"x 36".

DNR airphotos are predominantly red in color because they are taken with color infrared (CIR) film, which displays healthy vegetation in red rather than green tones. On CIR film, clear water usually appears black; turbid water appears light blue; paved and urban surfaces are usually blue-gray. The DNR photos are normally taken during fall, to capture color changes that help users distinguish vegetation types. Several trees in the sample below show fall color changes. Coniferous trees (pines, spruces, firs) normally appear darker red than broadleaved trees.

What you see . . . ***isn't*** **what you get.**



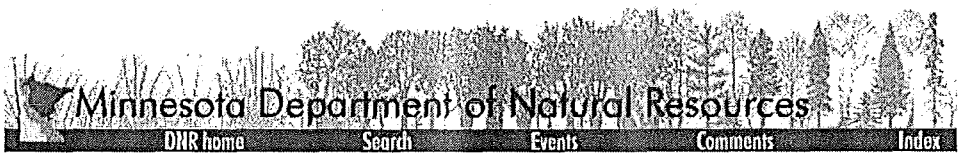
To let you browse DNR aerial photos conveniently in ***Air Photos Online***, we

have to "sample down" their resolution so the files are of a manageable size for delivery over the internet. The left image above represents a small piece of an ***Air Photos Online*** image, blown up to large scale. The right image shows the same small portion of the original photograph, similarly enlarged. To obtain a high-resolution image, you can order any DNR aerial photo--both the odd-numbered "online" and the even-numbered "offline" ones--directly from DNR Resource Assessment in Grand Rapids.

[Order Information] [Browse Online Photos]

DNR home

ForNet



About DNR Air Photos

Browse Online Photos

Order Information

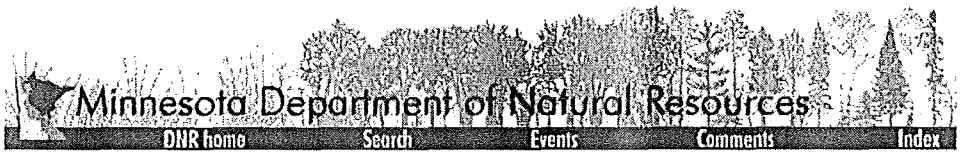
Air Photos Online is a digital aerial photography delivery service from Minnesota DNR ForNet. This service allows users to browse, download, and order Minnesota DNR aerial photography products via the Internet. Access to the photo databases is provided via an easy-to-use map-based interface that allows users to navigate to a particular photo(s) using a map window and a mouse.

Air Photos Online allows you to browse these photos with an easy-to-use map-based interface. Only half the available photographs--the odd-numbered ones--may be viewed here, but these provide 100% coverage of each county's area. (The even-numbered photos provide the overlap necessary for three-dimensional viewing under a stereoscope.)

Air Photos Online also provides all the information you need to order your own prints and enlargements of aerial photos from DNR's Resource Assessment office. Even with high-quality computer graphics, our online images can't approach the level of detail available in photographic prints.

Note: Please be aware that the photos accessible using this server are best viewed using hardware capable of at least 16-bit (32,000+) color resolution.

Begin Browsing Online Photos



Ordering Aerial Photos from DNR

To order aerial photographs from us, you need the following information:

1. The **ID number** of the photo you want to purchase. Get this from the online photo browser. Each photo has a 3-letter project code, a line number, and a frame number--for example, **sln-25-034**.

2. Our online order form, showing what products are available, and our price list, showing what they cost. These items are available through the links below. The files are in the Adobe .pdf format, and can be viewed or printed with the free Adobe Acrobat Reader.

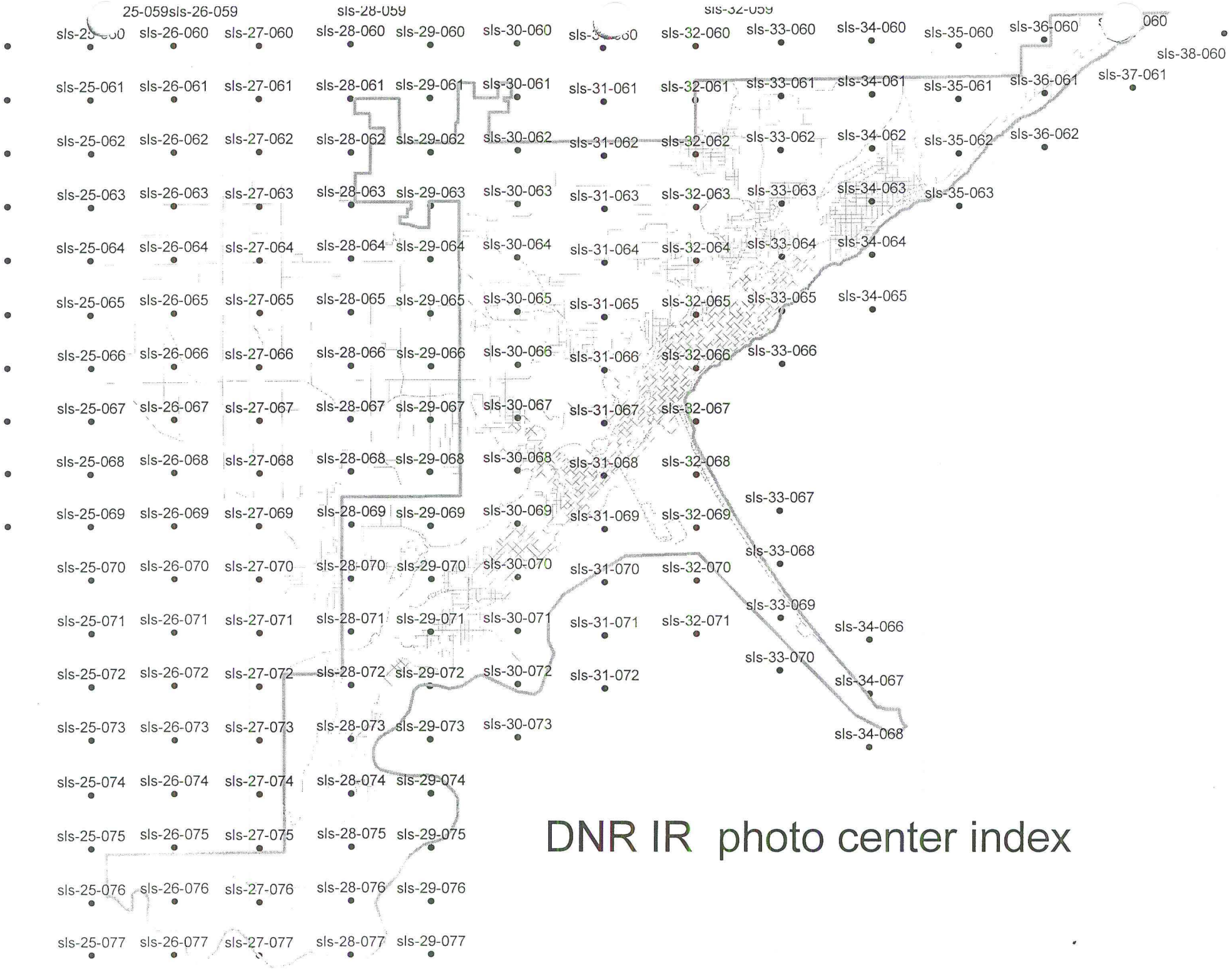
   Order Form
   Price List
   Both, in a single two-page file.

3. Completed forms and payment may be sent to us at the address below, or you may order by phone.

   DNR Resource Assessment
   413 SE 13th St.
   Grand Rapids MN, 55744 Tel: 218-327-4449 ext. 0

We take Visa and MasterCard by phone, check or credit by mail. Checks should be made out to "Department of Natural Resources".

[About DNR Air Photos] [Browse Online Photos]



DNR IR photo center index

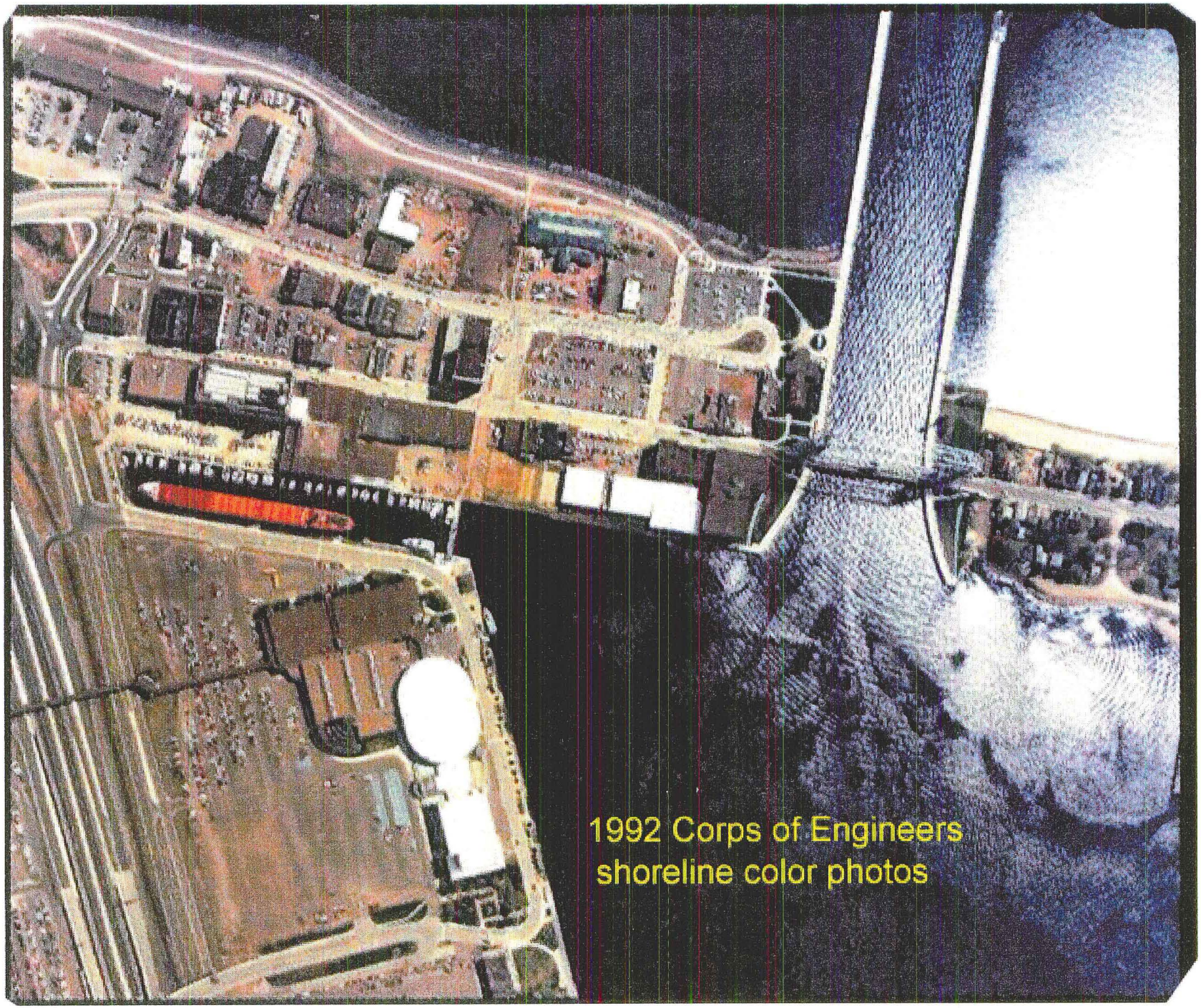
S1/2 SECTION 6 T50N, R13W

P-20

Date of Photography April 995

Scale: 1" = 200'

1995 scanned aerial photogrammetry


1992 Corps of Engineers
shoreline color photos

Example 1

Example 2

Example 2

Digital Orthophotos from Horizons

The following files are intended as samples of varying flying heights and output pixel resolutions for image scans or digital orthophoto products. In this sample data, the color image is an actual digital ortho, whereas the gray images are simply scanned unrectified photography. In the unrectified data therefore pixel resolution is approximate.

C2550_HF TIF 9,723,460
Color - 2550' AMT - 1:5100 photo scale (1"= 425')
Half foot orthophoto pixel
Output scales: 1"=50',100'

2700_15 TIF 16,017,054
Grayscale - 2700' AMT - 1:5400 photo scale (1"=450')
15 micron scan -Quarter foot pixel
Output scales: 1"=50'

2700_30 TIF 16,017,054
Grayscale - 2700' AMT - 1:5400 photo scale (1"=450')
30 micron scan - Half foot pixel
Output scales: 1"=50',100',200'

5000_15 TIF 16,017,054
Grayscale - 5080' AMT - 1:10056 photo scale (1"=838')
15 micron scan - Half foot pixel
Output scales: 1"=100',200'

5000_30 TIF 16,017,054
Grayscale - 5080' AMT - 1:10056 photo scale (1"=838')
30 micron scan - One foot pixel
Output scales: 1"=100',200',300'

9950_15 TIF 16,017,054
Grayscale - 9950' AMT - 1:19900 photo scale (1"=1658')
15 micron scan - One foot pixel
Output scales: 1"=200',300',400'

9950_30 TIF 16,017,054
Grayscale - 9950' AMT - 1:19900 photo scale (1"=1658')
30 micron scan - Two foot pixel
Output scales: 1"=200',300',400'

20000_15 TIF 16,017,054
Grayscale - 20000' AMT - 1:40000 photo scale (1"=3333')
15 micron scan - Two foot pixel
Output scales: 1"=350',400' up to 800'

20000_30 TIF 16,017,054
Grayscale - 20000' AMT - 1:40000 photo scale (1"=3333')
30 micron scan - Four foot pixel
Output scales: 1"=400' up to 800'

(The .tfw file is an ESRI georeferencing file).

N) HISTORICAL AIR PHOTOS

MARKHURD
CORPORATION
345 PENNSYLVANIA AVENUE SOUTH • MINNEAPOLIS, MINNESOTA 55426
TELEX 290-474 MARKHURD GOVY • TELEPHONE: (612) 545-2583

IN REPLY, REFER TO:

January 6, 1987

Dr. Carol Johnston
3151 Miller Trunk Hwy.
Duluth, MN 55811

Dear Dr. Johnston:

Enclosed please find MARKHURD's photo coverage of Lake Superior's North Shore, marked on four map sheets. The photo symbols, scales and dates of photography are all plainly marked and color coded as to their approximate location.

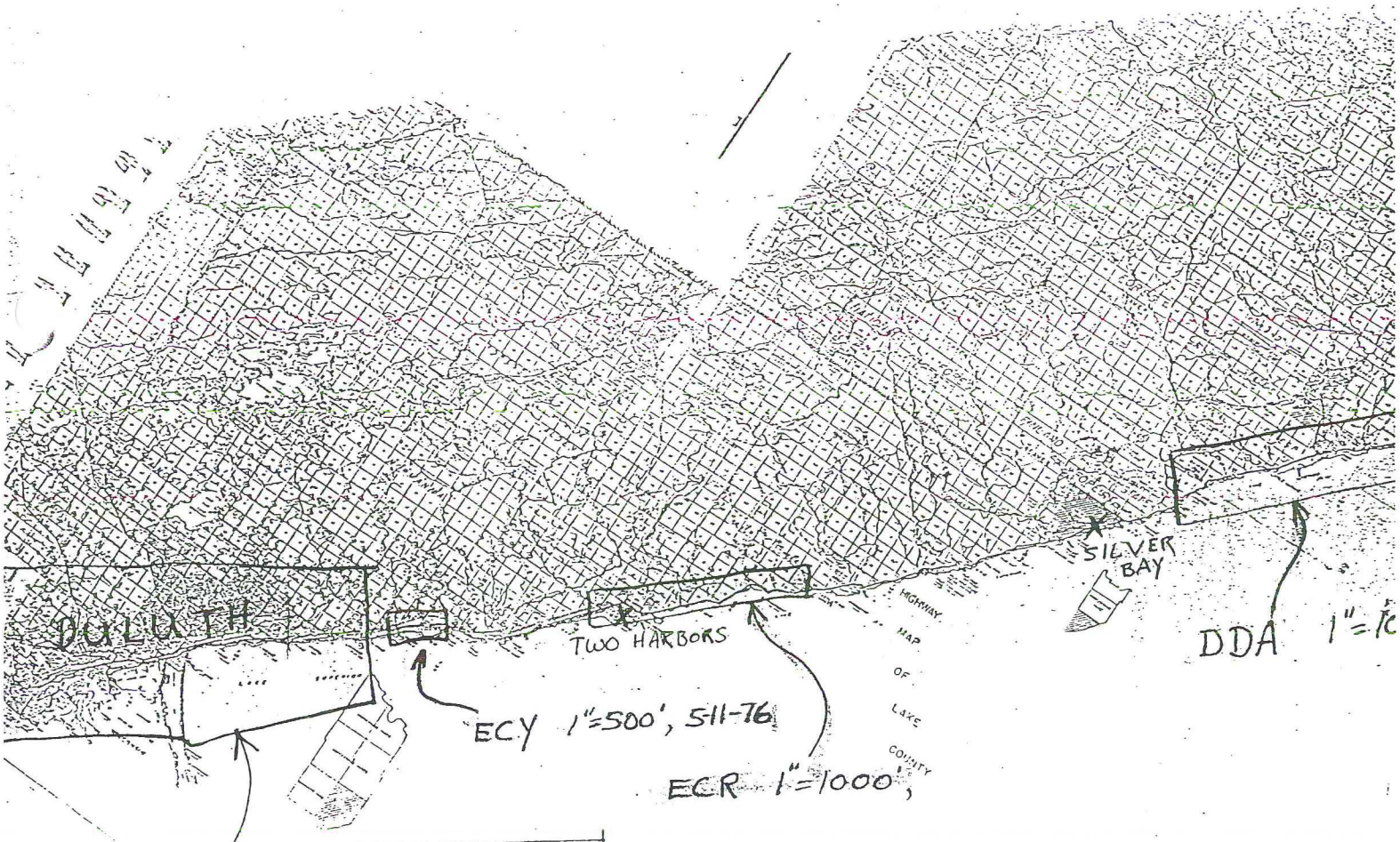
If you have any further questions, please let me know.

Sincerely,

Daniel J. Martonik

Daniel J. Martonik
Manager-Photo Services

DJM:mp
Enclosures



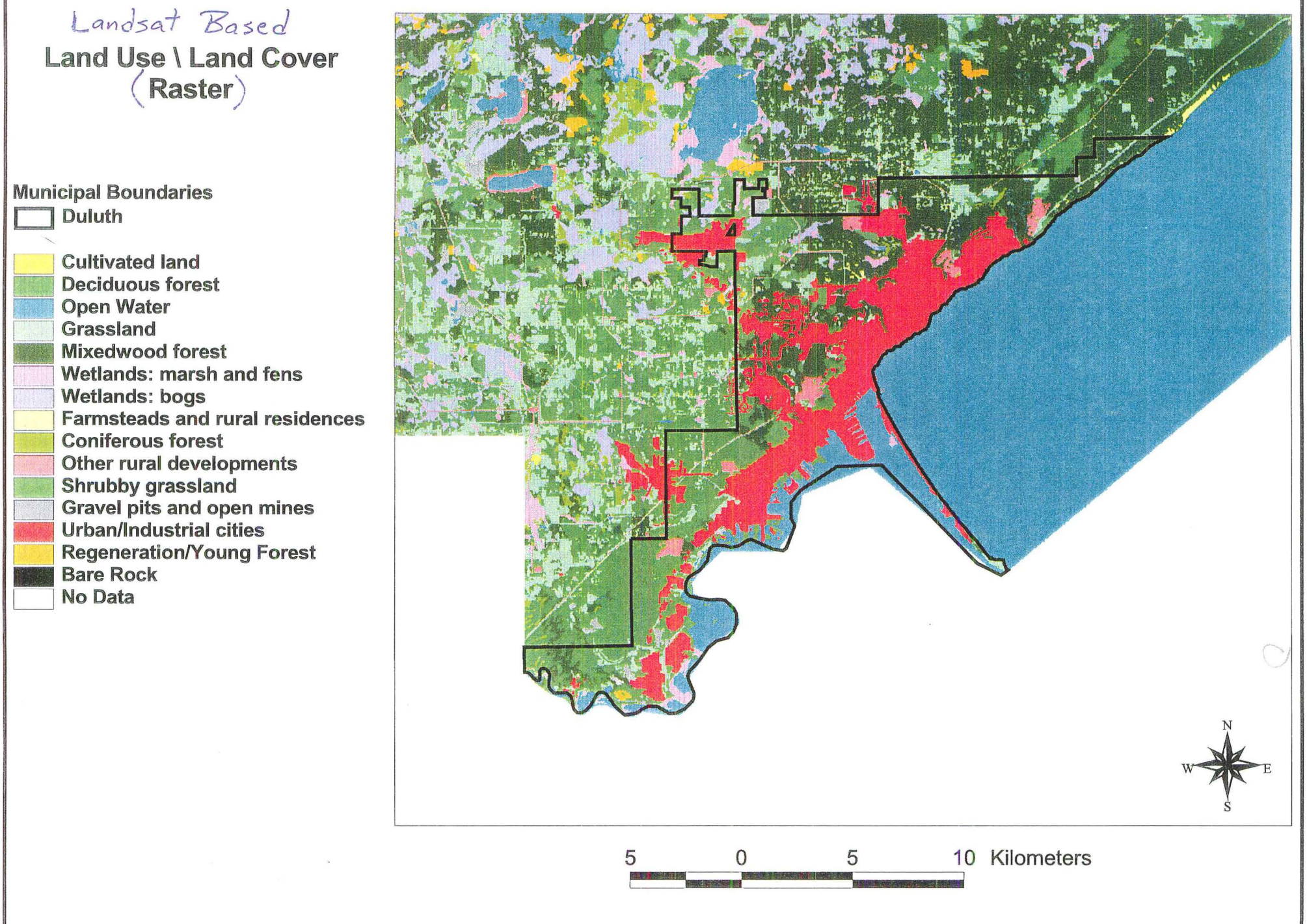
DULUTH AREA

FLP 1"=900', 6-11-79
EZK 1"=800', 4-30-78
DRC 1"=1000', 6-14-75
GEO 1"=500' * 1250', 10-27-81

DTE 1"=2000', 5/6, 1975

Landsat Based

Land Use \ Land Cover (Raster)



- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

Manitoba Remote Sensing Centre

LandSat-Based Land Use-Land Cover (Raster)

This page last update: 02/10/2000 3:08:26 PM
metadata created using Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1	*Identification Information - - - - - - top*
Originator	Manitoba Remote Sensing Centre
Title	LandSat-Based Land Use-Land Cover (Raster)
System Name	lusatra3
Abstract	Raster-based land cover data set derived from 30 meter resolution Thematic Mapper satellite imagery. Classification is divided into 16 classes with source imagery dates ranging from June 1995 to June 1996. DNR performed additional post-processing steps to replace transportation class cells with surrounding values.
Purpose	Land use planning, natural resource monitoring
Time Period of Content Date	6/18/1995
Currentness Reference	Date of source imagery (LANDSAT-5 TM, bands 3, 4, and 5) ranges from September 20, 1991 to August 30, 1996. Data production was conducted during the period of July 1996 to Summer 1998. The path/row number and image date for each county are: Aitkin_027/028_6/13/96, Carlton_027/028_6/13/96, Cass_028/027_6/18/95, Cook_026/027_6/1/94, Crow Wing_028/027_6/18/95, Hubbard_028/027_6/18/95, Itasca_028/027_6/18/95, Koochiching_028/027_6/18/95, Lake_026/027_6/1/94, Lake of the Woods_027/028_8/30/96, Mille Lacs_027/028_9/20/91, Pine_027/028_6/13/96, St. Louis_027/027_6/8/94, Wadena_028/027_6/18/95
Progress	In progress
Maintenance and Update Frequency	None Planned
Spatial Extent of Data	An area covering the Arrowhead region of Northeastern Minnesota, roughly corresponding to the principal forested region of the state. Counties included in the coverage at the time of this writing are: Aitkin, Cass, Crow Wing, Hubbard, Itasca, Koochiching, Pine, and Wadena. At the time of this writing, Carlton, Lake, and Lake of the Woods counties have been completed but not acquired,

and St.Louis and Cook counties are in progress.

Bounding Coordinates	E = -89 W = -97.5 N = 49.5 S = 43
Place Keywords	Minnesota, Northeastern Minnesota, Iron Range, Mesabi Range, Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mille Lacs, Pine, St. Louis, Wadena
Theme Keywords	Land Cover, Land Use, Vegetation Cover
Theme Keyword Thesaurus	None
Access Constraints	None
Use Constraints	None
Contact Person Information	Tim Loesch, GIS Application Coordinator DNR-MIS 500 Lafayette Road St. Paul, MN 55155-4011 Phone: (651) 296-0654 FAX: (651) 297-4946 E-mail: tim.loesch@dnr.state.mn.us
Browse Graphic File Name	lusatra3_sam.gif
Browse Graphic File Description	
Associated Data Sets	A vector-based version of this data set exists within the DNR Core Database [LandSat-Based Land Use-Land Cover (Raster); lusatpy2, layer number 12009].

Section 2 *Data Quality Information - - - - - - top*

Attribute Accuracy The data set exhibits a per class and overall classification accuracy of not less than 95 percent. Accuracy assessment was conducted using a random, area-based sampling scheme, with the number of samples per class chosen to reflect the relative area occupied by each class within the individual county-sized areas being evaluated. Random samples were generated within each data set being evaluated. Sample areas were then checked against NHAP color infrared photography for correctness within the fixed sample plot. Results of the analysis were plotted in confusion matricies and analyzed for conformance to the 95 percent classification accuracy specification. The DNR's Division of Forestry spot field checked the category of 'young forest/regeneration' against their forest inventory data. They suggested rewording the definition of this class, as noted in the Entity and Attribute Overview element. (The original definition read: Areas where commercial timber has been completely or partially removed by logging; management activities whose goal is to enhance timber productivity and/or wildlife habitat and to provide age class and species diversity; and catastrophic events, primarily fire and wind damage. These activities have taken place in the last 15 years. Almost all of these areas have been replanted or naturally regenerated into young trees.)

Logical Consistency Data are stored within a valid ARC/INFO GRID data structure.

Completeness	Data provides complete coverage over the stated extent of the data
Horizontal Positional Accuracy	Unknown. The 30 meter source imagery sampling size automatically introduces a potential offset of this amount. Georegistration processes would likely introduce an additional 30-60 meters offset. Individual area feature boundaries may exhibit additional offsets of up to 1/2 pixel (15 meters) based on theoretical limitations in image sampling devices. Additional offsets may be present due to a lack of boundary clarity between some classes, edge pixel effects, and image post-processing (smoothing) effects.
Vertical Positional Accuracy	Not Applicable
Lineage	Landsat Thematic Mapper imagery (bands 3,4, and 5 only) was classified over county-based areas using a supervised maximum likelihood classification within PCI software. Three iterations of classification were typically performed prior to subjecting the data to an exhaustive manually verification-editing process where each classified area was compared with NHAP 1:60,000 scale color, and black and white infrareg photography for correct interpretation. Areas found to be missclassifed were recoded or aggregated, as appropriate, at this juncture. Transitional feature types (e.g. coniferous, mixed, deciduous forest classes) were handled by first developing a clasification using relatively pure samples of individual types and performing a limited classification around a tightly controlled confidence interval. Mixed classes falling outside of the pure class confidence interval were then allowed to fall out into a single mixed class. Following verification and manual editing processes. Individual county data sets were subjected to the classification accuracy assessment process outlined in the Attribute Accuracy section of this report. Completed PCI files were exported to ERDAS format. Data were received by Minnesota DNR from the Land Management Information Center (LMIC; A division of Minnesota Planning) and converted from ERDAS format to ARC/INFO GRID.The data were then subject to the ARC/INFO Spatial Analyst filtering function NIBBLE to remove road features. NIBBLE uses a Euclidean distance-nearest neighbor algorithm to reassign values to the pixels that originally were assigned road class values. Because the road pixels existed singly or in groups of two, the NIBBLE function effectively reassigned all of these pixels in a single processing pass.
Source Scale Denominator	60000

Section 3	*Spatial Data Organization Information - - - - - - top*
Native Data Set Environment	ARC/INFO GRID
Geographic Reference for Tabular Data	Not Applicable
Spatial Object Type	Raster
Vendor Specific Object Types	GRID
Tiling Scheme	County

Section 4	*Spatial Reference Information - - - - - - top*
Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980
Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	n/a
Altitude Units	n/a
Depth Datum	n/a
Depth Units	n/a
Cell Width	30
Cell Height	30
Latitude Resolution	0
Longitude Resolution	0
UTM Zone Number	0
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5	*Entity and Attribute Information - - - - - - top*
Entity and Attribute Overview	30 meter resolution raster data elements classified into 16 land cover classes
Entity and Attribute Detailed Citation	LandSat-Based Land Use-Land Cover (Vector)
HTML Table	--lusatra3.vat-- ARC/INFO Grid Value Attribute Table (VAT) Value 1 = Cultivated land - Includes those areas under intensive cropping or rotation, inluding fallow fields. Fields seeded to forage or cover crops are included. The fields exhibit linear or other patterns associated with current or recent tillage. 2 = Deciduous forest - Includes areas with at least two-thirds or more of the

total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, and plantations.
3 = Open water - Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas where photo evidence indicates that the area is covered by water the majority of the time.
4 = Grassland - Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural land and more heavily wooded areas, along right-of-ways and drains. Some areas may be used as pastures and be mowed or grazed, and may range in appearance from very smooth to quite mottled. Included are fields which show evidence of past tillage but now appear to be abandoned and grown to native vegetation or planted to a cover crop.
5 = Mixed-wood forest: Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.
6 = Wetlands: marsh and fens - Grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophytic vegetation such as cattail and rushes. Areas are often interspersed with channels or pools of open water.
7 = Wetlands: bogs - Peat covered or peat filled depressions with a high water table. The bogs are covered with a carpet of sphagnum and ericaceous shrubs and may be treeless or tree covered with black spruce and/or tamarack.
8 = Farmsteads and rural residences - Farmsteads include farmhouse and adjoining farmyard area. Includes machinery storage buildings, grain storage buildings, corrals, livestock holding and feeding areas directly associated with farmyard area.
9 = Coniferous forest - Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and plantations.
10 = Other rural developments - Includes commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips, landfills, storage maintenance yards, businesses, factories, lumber mills, commercial livestock/poultry/grain operations. Cultural/recreational developments include built-up facilities and service areas associated with parks, rest areas, campgrounds, and golf courses. Includes churches, cemeteries, community halls, and rural schools. Agricultural developments include agricultural facilities not directly associated with farmsteads. Includes machine and grain storage areas, barns and corrals, and isolated buildings and farmsteads that no longer have apparent road access.
11= Shrubby grassland - This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.
12 = Gravel pits and open mines - Areas are stripped of top soil revealing exposed substrate such as sand/gravel. Included are gravel quarry operations, mine tailings, burrow pits, and rock quarries. Natural beaches/sand dunes are included.
13 = Urban/industrial (cities)
14 = Regeneration/Young Forest - Areas where commercial timber has been completely or partially removed by logging; management activities whose goal is to enhance timber productivity and/or wildlife habitat and to provide age

class and species diversity; and catastrophic events, primarily fire and wind damage. These activities have taken place in the last 15 years. Almost all of these areas have been replanted or naturally regenerated into young trees.
15 = Bare rock - Includes areas of rock outcrops that lack appreciable soil development or vegetation cover.
16 = Roads, improved trails, rail lines - Roads and Improved Trails and Rail Lines Includes all highways, secondary gravel roads, and improved dirt trails, rail lines and utility easements.

Section 6	*Distribution Information - - - - - - top*
Publisher	Minnesota DNR - MIS Bureau
Publication Date	12/1/1997
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	lusatra3
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO
Transfer Size	14.5
Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

Section 7	*Metadata Reference Information - - - - - - top*
Metadata Date	2/3/1998
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR - MIS Bureau 500 Lafayette Road Saint Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.1
Metadata Standard	http://www.lmic.state.mn.us/gc/stds/metadata.htm

Online Linkage

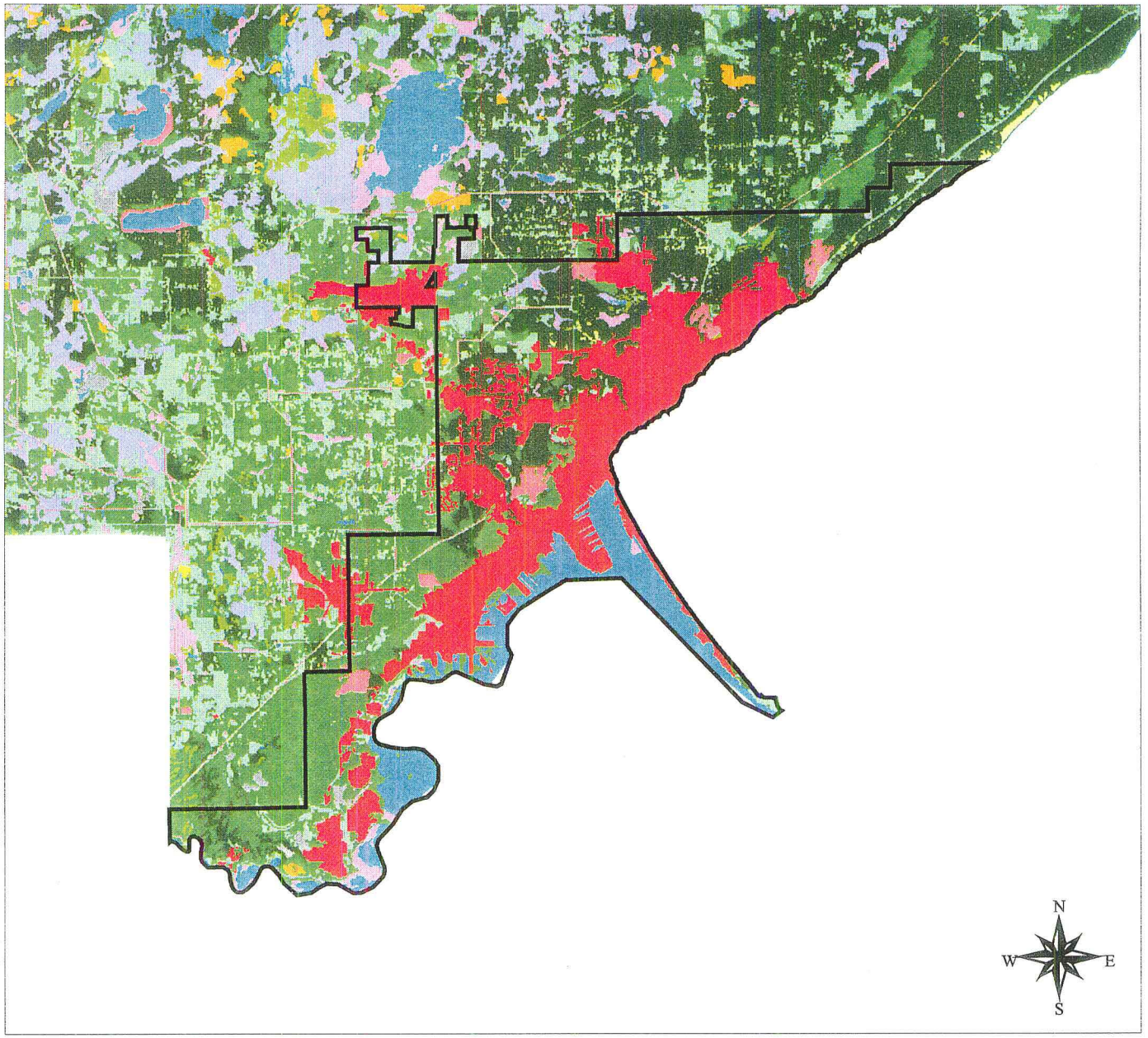
LandSat-Based Land Use-Land Cover (Raster)

Table Name	Field Name	Begin Column	Definition	Valid Values	Description
lusatra3.vat					ARC/INFO Grid Value Attribute Table (VAT)
	Value	1	4, 10, B		
				1	Cultivated land - Includes those areas under intensive cropping or rotation, inluding fallow fields. Fields seeded to forage or cover crops are included. The fields exhibit linear or other patterns associated with current or recent tillage.
				2	Deciduous forest - Includes areas with at least two-thirds or more of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, and plantations.
				3	Open water - Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas where photo evidence indicates that the area is covered by water the majority of the time.
				4	Grassland - Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural land and more heavily wooded areas, along right-of-ways and drains. Some areas may be used as pastures and be mowed or grazed, and may range in appearance from very smoooth to quite mottled. Included are fields which show evidence of past tillage but now appear to be abandoned and grown to native vegetation or planted to a cover crop.
				5	Mixedwood forest: Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.
				6	Wetlands: marsh and fens - Grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophytic vegetation such as cattail and rushes.

	Areas are often interspersed with channels or pools of open water.
7	Wetlands: bogs - Peat covered or peat filled depressions with a high water table. The bogs are covered with a carpet of sphagnum and ericaceous shrubs and may be treeless or tree covered with black spruce and/or tamarack.
8	Farmsteads and rural residences - Farmsteads include farmhouse and adjoining farmyard area. Includes machinery storage buildings, grain storage buildings, corrals, livestock holding and feeding areas directly associated with farmyard area.
9	Coniferous forest - Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and plantations.
10	Other rural developments - Includes commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips, landfills, storage maintenance yards, businesses, factories, lumber mills, commercial livestock/poultry/grain operations. Cultural/recreational developments include built-up facilities and service areas associated with parks, rest areas, campgrounds, and golf courses. Includes churches, cemeteries, community halls, and rural schools. Agricultural developments include agricultural facilities not directly associated with farmsteads. Includes machine and grain storage areas, barns and corrals, and isolated buildings and farmsteads that no longer have apparent road access.
11	Shrubby grassland - This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.

12	Gravel pits and open mines - Areas are stripped of top soil revealing exposed substrate such as sand/gravel. Included are gravel quarry operations, mine tailings, burrow pits, and rock quarries. Natural beaches/sand dunes are included.
13	Urban/industrial (cities
14	Regeneration/Young Forest - DNR revised definition (see Attribute Accuracy element for original definition): This class is made up of areas that have a good likelihood of being young forest which were replanted or naturally regenerated since 1970. It includes lands that were commercially logged or affected by catastrophic events, primarily fire and wind damage. Caution: Two significant sources of classification confusion exist that result in older forest being classed as young. (1) One source of confusion results because stands having very good conditions for regrowth (measured by site index) mature faster than stands with poor regrowth conditions. The result is older stands with a low site index look very much like younger stands having a higher site index. (2) A second source of confusion is caused by some misclassified mature hardwoods that are found in this category, possibly misclassified because the crown cover is similar to the dense cover such as that which exists in a regenerating aspen stand.
15	Bare rock - Includes areas of rock outcrops that lack appreciable soil development or vegetation cover.

Landsat Based Land Use - Land Cover (Vector)



- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

Manitoba Remote Sensing Centre

LandSat-Based Land Use-Land Cover (Vector)

This page last update: 02/10/2000 3:08:26 PM
metadata created using Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1	*Identification Information* - - - - - - *top*
Originator	Manitoba Remote Sensing Centre
Title	LandSat-Based Land Use-Land Cover (Vector)
System Name	lusatpy3
Abstract	Vector-based land cover data set derived from classified 30 meter resolution Thematic Mapper satellite imagery. Classification is divided into 16 classes with source imagery dates ranging from June 1995 to June 1996. DNR performed additional post-processing steps to replace transportation class cells with surrounding values and convert the data into a vector format.
Purpose	Land use planning, natural resource monitoring
Time Period of Content Date	6/18/1995
Currentness Reference	Date of source imagery ranges from June 18th, 1995 to June 13th, 1996. Data production was conducted during the period of July 1996 to December of 1997
Progress	In-Progress
Maintenance and Update Frequency	None Planned
Spatial Extent of Data	An area covering the Arrowhead region of Northeastern Minnesota, roughly corresponding to the principal forested region of the state. Counties included in the coverage at the time of this writing are: Aitkin, Cass, Crow Wing, Hubbard, Itasca, Koochiching, Pine, and Wadena. At the time of this writing, Carlton, Lake, and Lake of the Woods counties have been completed but not acquired, and St.Louis and Cook counties are in progress.
Bounding Coordinates	E = -89 W = -97.5 N = 49.5 S = 43
Place Keywords	Minnesota, Northeastern Minnesota, Iron Range, Mesabi Range

Theme Keywords	Land Cover, Land Use, Vegetation, Forests
Theme Keyword Thesaurus	None
Access Constraints	None
Use Constraints	None
Contact Person Information	Tim Loesch, GIS Application Coordinator DNR-MIS 500 Lafayette Road St. Paul, MN 55155-4011 Phone: (651) 296-0654 FAX: (651) 297-4946 E-mail: tim.loesch@dnr.state.mn.us
Browse Graphic File Name	lusatpy3_sam.gif
Browse Graphic File Description	
Associated Data Sets	A raster-based version of this data set exists within the DNR Core Database [LandSat-Based Land Use-Land Cover (Raster); lusatpy2, layer number 12008].

Section 2 *Data Quality Information* - - - - - - *top*

Attribute Accuracy	The data set exhibits a per class and overall classification accuracy of not less than 95 percent. Accuracy assessment was conducted using a random, area-based sampling scheme, with the number of samples per class chosen to reflect the relative area occupied by each class within the individual county-sized areas being evaluated. Random samples were generated within each data set being evaluated. Sample areas were then checked against NHAP color infrared photography for correctness within the fixed sample plot. Results of the analysis were plotted in confusion matricies and analyzed for conformance to the 95 percent classification accuracy specification. The DNR's Division of Forestry spot field checked the category of 'young forest/regeneration' against their forest inventory data. They suggested rewording the definition of this class, as noted in the Entity and Attribute Overview element. (The original definition read: Areas where commercial timber has been completely or partially removed by logging; management activities whose goal is to enhance timber productivity and/or wildlife habitat and to provide age class and species diversity; and catastrophic events, primarily fire and wind damage. These activities have taken place in the last 15 years. Almost all of these areas have been replanted or naturally regenerated into young trees.)
Logical Consistency	Data are topolocially correct using ARC/INFO 7.0.4. All polygons are closed and lines intersect where intended.
Completeness	ata provides complete coverage over the stated extent of the data
Horizontal Positional Accuracy	Unknown. The 30 meter source imagery sampling size automatically introduces a potential offset of this amount. Georegistration processes would likely introduce an additional 30-60 meters offset. Individual area feature boundaries may exhibit additional offsets of up to 1/2 pixel (15 meters) based on theoretical limitations in image sampling devices. Additional offsets may be present due to a lack of boundary clarity between some classes, edge pixel effects, and image

	post-processing (smoothing) effects.
Vertical Positional Accuracy	Not Applicable
Lineage	Landsat Thematic Mapper imagery (bands 3,4, and 5 only) was classified over county-based areas using a supervised maximum likelihood classification within PCI software. Three iterations of classification were typically performed prior to subjecting the data to an exhaustive manually verification-editing process where each classified area was compared with NHAP 1:60,000 scale color, and black and white infrareg photography for correct interpretation. Areas found to be missclassifed were recoded or aggregated, as appropriate, at this juncture. Transitional feature types (e.g. coniferous, mixed, deciduous forest classes) were handled by first developing a clasification using relatively pure samples of individual types and performing a limited classification around a tightly controlled confidence interval. Mixed classes falling outside of the pure class confidence interval were then allowed to fall out into a single mixed class. Following verification and manual editing processes. Individual county data sets were subjected to the classification accuracy assessment process outlined in the Attribute Accuracy section of this report. Completed PCI files were exported to ERDAS format. Data were received by Minnesota DNR from the Land Management Information Center (LMIC; A division of Minnesota Planning) and converted from ERDAS format to ARC/INFO GRID. The data were then subject to the ARC/INFO Spatial Analyst filtering function NIBBLE to remove road features. NIBBLE uses a Euclidean distance-nearest neighbor algorithm to reassign values to the pixels that originally were assigned road class values. Because the road pixels existed singly or in groups of two, the NIBBLE function effectively reassigned all of these pixels in a single processing pass. After eliminating the road pixels, DNR staff used the GRIDPOLY command in ARC/INFO to create dissolved vector representations of the land cover areas. No splining or generalization processes were applied to the lines.
Source Scale Denominator	60000

Section 3	*Spatial Data Organization Information - - - - - - top*
Native Data Set Environment	ARC/INFO
Geographic Reference for Tabular Data	Not Applicable
Spatial Object Type	vector
Vendor Specific Object Types	polygon
Tiling Scheme	county

Section 4	*Spatial Reference Information - - - - - - top*
Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980

Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	n/a
Altitude Units	n/a
Depth Datum	n/a
Depth Units	n/a
Cell Width	0
Cell Height	0
Latitude Resolution	0
Longitude Resolution	0
UTM Zone Number	15
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	n/a
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5 *Entity and Attribute Information - - - - - - top*

Entity and Attribute Overview Polygonal areas coded for one of 15 land cover categories. 1 = Cultivated land 2 = Deciduous forest, 3 = Open water, 4 = Grassland, 5 = Mixedwood forest, 6 = Wetlands - marsh and fens, 7 = Wetlands - bogs, 8 = Farmsteads and rural residences, 9 = Coniferous forest, 10 = Other rural developments, 11 = Shrubby grassland, 12 = Gravel pits and open mines, 13 = Urban/industrial (cities & towns), 14 = Regeneration/Young Forests, 15 = Bare rock

Entity and Attribute Detailed Citation

HTML Table

Section 6 *Distribution Information - - - - - - top*

Publisher	Minnesota DNR - MIS Bureau
Publication Date	2/1/1998
Contact Person	Robert Maki, GIS Database Coordinator

Information	Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	lusatpy3
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO
Transfer Size	275
Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

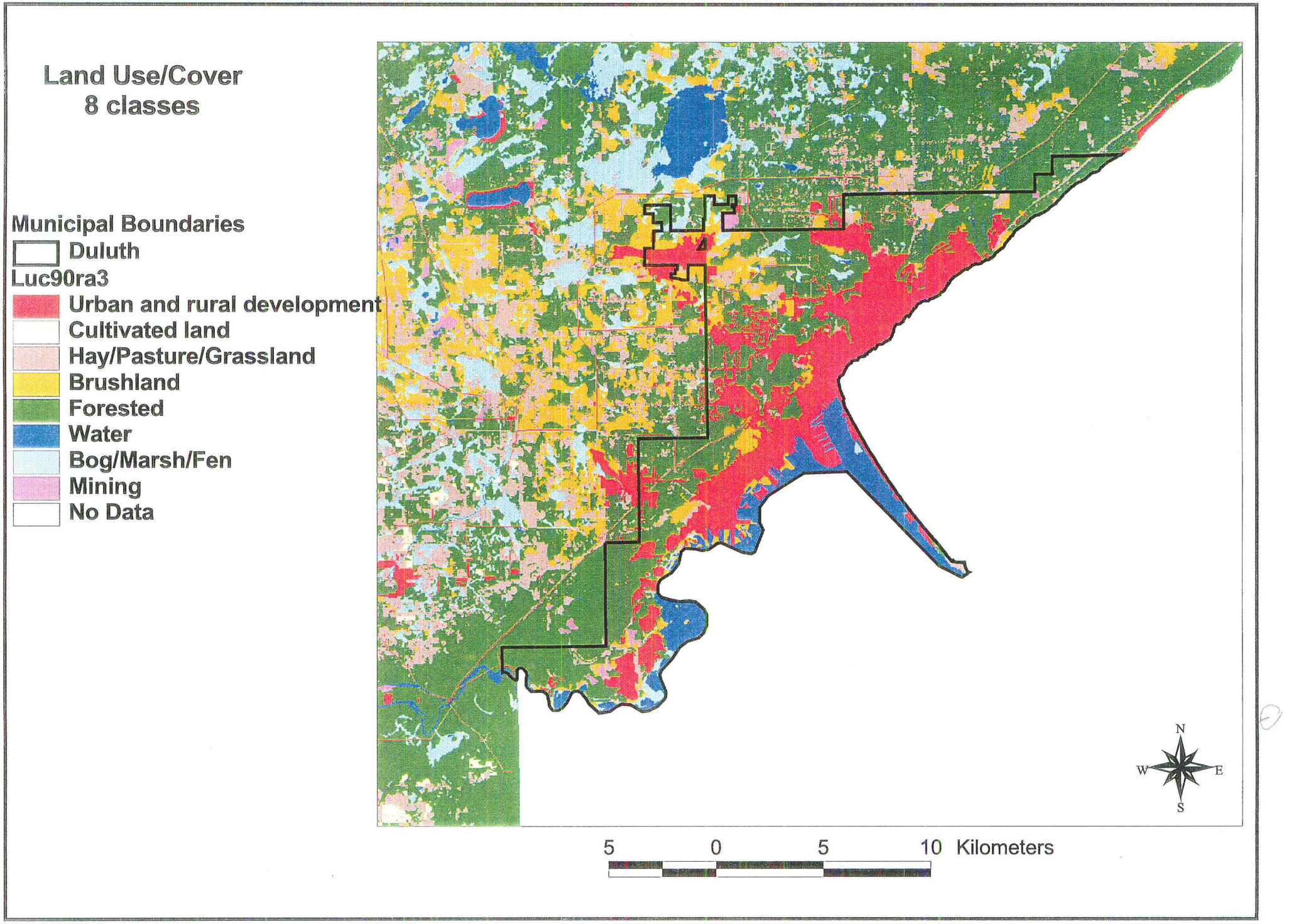
Section 7	*Metadata Reference Information - - - - - - top*
Metadata Date	3/29/1999
Contact Person Information	Tim Loesch, GIS Applications Programmer Minnesota DNR - MIS Bureau 500 Lafayette Road St. Paul, MN 55155 Phone: 651-296-0654 FAX: 651-297-4946 E-mail: tim.loesch@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.1
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

LandSat-Based Land Use-Land Cover (Vector)

Table Name	Field Name	Begin Column	Definition	Valid Values	Description
lusatra3.pat					ARC/INFO Grid Value Attribute Table (VAT)
	LUSE_CODE	25	2, 2, I		
				1	Cultivated land - Includes those areas under intensive cropping or rotation, inluding fallow fields. Fields seeded to forage or cover crops are included. The fields exhibit linear or other patterns associated with current or recent tillage.
				2	Deciduous forest - Includes areas with at least two-thirds or more of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, and plantations.
				3	Open water - Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas where photo evidence indicates that the area is covered by water the majority of the time.
				4	Grassland - Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural land and more heavily wooded areas, along right-of-ways and drains. Some areas may be used as pastures and be mowed or grazed, and may range in appearance from very smoooth to quite mottled. Included are fields which show evidence of past tillage but now appear to be abandoned and grown to native vegetation or planted to a cover crop.
				5	Mixedwood forest: Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.
					Wetlands: marsh and fens - Grassy,

6	wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophytic vegetation such as cattail and rushes. Areas are often interspersed with channels or pools of open water.
7	Wetlands: bogs - Peat covered or peat filled depressions with a high water table. The bogs are covered with a carpet of sphagnum and ericaceous shrubs and may be treeless or tree covered with black spruce and/or tamarack.
8	Farmsteads and rural residences - Farmsteads include farmhouse and adjoining farmyard area. Includes machinery storage buildings, grain storage buildings, corrals, livestock holding and feeding areas directly associated with farmyard area.
9	Coniferous forest - Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and plantations.
10	Other rural developments - Includes commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips, landfills, storage maintenance yards, businesses, factories, lumber mills, commercial livestock/poultry/grain operations. Cultural/recreational developments include built-up facilities and service areas associated with parks, rest areas, campgrounds, and golf courses. Includes churches, cemeteries, community halls, and rural schools. Agricultural developments include agricultural facilities not directly associated with farmsteads. Includes machine and grain storage areas, barns and corrals, and isolated buildings and farmsteads that no longer have apparent road access.

			11	Shrubby grassland - This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.
			12	Gravel pits and open mines - Areas are stripped of top soil revealing exposed substrate such as sand/gravel. Included are gravel quarry operations, mine tailings, burrow pits, and rock quarries. Natural beaches/sand dunes are included.
			13	Urban/industrial (cities
			14	Regeneration/Young Forest - DNR revised definition (see Attribute Accuracy element for original definition): This class is made up of areas that have a good likelihood of being young forest which were replanted or naturally regenerated since 1970. It includes lands that were commercially logged or affected by catastrophic events, primarily fire and wind damage. Caution: Two significant sources of classification confusion exist that result in older forest being classed as young. (1) One source of confusion results because stands having very good conditions for regrowth (measured by site index) mature faster than stands with poor regrowth conditions. The result is older stands with a low site index look very much like younger stands having a higher site index. (2) A second source of confusion is caused by some misclassified mature hardwoods that are found in this category, possibly misclassified because the crown cover is similar to the dense cover such as that which exists in a regenerating aspen stand.
			15	Bare rock - Includes areas of rock outcrops that lack appreciable soil development or vegetation cover.
LUSE_NAME	27	35, 35, C		Long name of the land use classes described in LUSE_CLASS.


Land Use/Cover
8 classes
Municipal Boundaries
Duluth
Luc90ra3
Urban and rural development
Cultivated land
Hay/Pasture/Grassland
Brushland
Forested
Water
Bog/Marsh/Fen
Mining
No Data
N
W
E
S
5
0
5
10 Kilometers

Minnesota Land Management Information Center Metadata Directory

Metadata Summary

Minnesota Land Use and Cover: 1990's Census of the Land (8 category statewide)

Originator Minnesota Department of Natural Resources

Abstract This data set integrates six different source data sets to provide a simplified overall view of Minnesota's land use / cover. The six source data sets covered different parts of the state, were in differing formats, and used different legend classifications. MnDNR developed a simplified 8-category legend and translated each source data set's original detailed classification into the 8-category system. They also standardized the data to 30 meter grid cells. The data set was used to produce a 43 inch by 50 inch wall map of the same title.

Time Period of Content Date

Currentness Reference The dates for the source data sets range between 1987 - 1996.

1. Agricultural and Transition Areas: Approximately 1989 - 1991
2. Forested Areas: 1991 - 1996
3. Metropolitan Counties: TM imagery 1991 (all classes in original data set were used); Generalized Land Use from the Metropolitan Council 1990 (only the farmstead class from the original data was used)
4. Beltrami and Clearwater Counties: 1987
5. Olmsted County: 1992
6. Camp Ripley 1992 and 1996; Beltrami Island State Forest 1993 and 1996

Access Constraints Only the 8-class legend attributes are distributed for this dataset. For the more detailed legends, users need to obtain the original datasets (see Associated Data Sets element).

Use Constraints Redistribution Conditions: In obtaining these data from LMIC, it is understood that you and/or your organization have the right to use them for any internal purpose. If you modify them, you should document those changes in a metadata record that should accompany all redistributed data. If you transmit or provide these data in any form to another user, the data MUST be accompanied by a copy of LMIC's disclaimer NOTICE.TXT and all documentation provided with the original data set including the full metadata record.

Browse Graphic File Name http://mapserver.lmic.state.mn.us/landuse/

Distributor Contact Person Nancy Rader

Distributor Organization Minnesota Land Management Information Center (LMIC)

Distributor Voice Phone 651-296-1211

Ordering Instructions This data set is distributed on the internet by clicking below after Online Linkage. Doing so will tell your browser to start downloading a self-extracting 'ZIP' file which will contain the following:

- An Arc/INFO Grid file
- A default color palette (.clr) for use when displaying in software such as ArcView
- Documentation (.htm) file for the dataset
- NOTICE.RTF, an important notice about this data set that can be read by most word processing software, and an ascii text version of the same notice (NOTICE.TXT)

After downloading this self-extracting 'zip' file (which will have an 'exe' extension), simply execute (run) the file. (For example, you can double click it from Windows Explorer or File Manager). Doing this will

automatically extract the files described above. You can then delete file types that you do not need, if any.

(The file is also available in EPPL7 format. Go to ftp://ftp.lmic.state.mn.us/pub/data/phys_biol/landuse and download the luse8epp.exe file. This format will also soon be available on a CD data collection; contact LMIC for more information.)

Online Linkage Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" above.

Full Metadata Record

These metadata were created using the Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1 Identification Information

Originator Minnesota Department of Natural Resources

Title Minnesota Land Use and Cover: 1990's Census of the Land (8 category statewide)

Abstract This data set integrates six different source data sets to provide a simplified overall view of Minnesota's land use / cover. The six source data sets covered different parts of the state, were in differing formats, and used different legend classifications. MnDNR developed a simplified 8-category legend and translated each source data set's original detailed classification into the 8-category system. They also standardized the data to 30 meter grid cells. The data set was used to produce a 43 inch by 50 inch wall map of the same title.

Purpose The original purpose of the data set was to create the wall map showing a statewide view of Minnesota land use. The data set can also be used for general statewide analysis. For studies at the regional, county or more local level, users are encouraged to go back to the original data sets which contain more spatial and attribute detail.

Time Period of Content Date

Currentness Reference The dates for the source data sets range between 1987 - 1996.

1. Agricultural and Transition Areas: Approximately 1989 - 1991
2. Forested Areas: 1991 - 1996
3. Metropolitan Counties: TM imagery 1991 (all classes in original data set were used); Generalized Land Use from the Metropolitan Council 1990 (only the farmstead class from the original data was used)
4. Beltrami and Clearwater Counties: 1987
5. Olmsted County: 1992

	6. Camp Ripley 1992 and 1996; Beltrami Island State Forest 1993 and 1996
Progress	Complete
Maintenance and Update Frequency	None planned
Spatial Extent of Data	Minnesota
Bounding Coordinates	-95.4 -89.5 49.4 45.5
Place Keywords	Minnesota
Theme Keywords	Land Use, Land Cover, Vegetation, Forest
Theme Keyword Thesaurus	
Access Constraints	Only the 8-class legend attributes are distributed for this dataset. For the more detailed legends, users need to obtain the original datasets (see Associated Data Sets element).
Use Constraints	Redistribution Conditions: In obtaining these data from LMIC, it is understood that you and/or your organization have the right to use them for any internal purpose. If you modify them, you should document those changes in a metadata record that should accompany all redistributed data. If you transmit or provide these data in any form to another user, the data MUST be accompanied by a copy of LMIC's disclaimer NOTICE.TXT and all documentation provided with the original data set including the full metadata record.
Contact Person Information	Tim Loesch, GIS Applications Programmer Minnesota Department of Natural Resources 500 Lafayette Street St. Paul, MN 55155 Phone: (651) 296-0654 FAX: (651) 296-4946 E-mail: tim.loesch@dnr.state.mn.us
Browse Graphic File Name	http://mapserver.lmic.state.mn.us/landuse/
Browse Graphic File Description	This application on LMIC's web site allows users to view the 8-category map and to generate statistics by state, county, or user-specified group of counties.
Associated Data Sets	Minnesota Land Use - Agricultural and Transition Areas This data set uses a 17-category classification scheme based on the Anderson Classification. It covers 63 counties in the western and southern parts of the state. Interpretation and coding of land use were done by The International Coalition for Land and Water Stewardship in the Red River Basin. For further information, see: http://lucy.lmic.state.mn.us/metadata/luse89.html or contact LMIC (see Section 6 of this document for contact information). Minnesota Land Use - Forested Area The Manitoba Remote Sensing Centre interpreted Landsat Thematic Mapper (TM) imagery to create a raster (grid cell) land use data set for the following predominantly forested counties: Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mille Lacs, Pine, St. Louis, and Wadena. Date of Landsat imagery ranges from September 1991 to

August 1996. A 16-category classification system was used. For more information, see documentation at:
http://lucy.lmic.state.mn.us/metadata/mrsc_lu.html or contact LMIC.

1990 Generalized Land Use for the Twin Cities Metropolitan Area
This data set was developed by the Metropolitan Council and encompasses the seven county Twin Cities (Minneapolis and St. Paul) Metropolitan Area in Minnesota. The data were interpreted from 1990 air photos and include thirteen generalized land use classes. For more information, see:
http://www.datafinder.org/metadata/metc0009.htm or contact Deb Crouley, Metropolitan Council, Mears Park Centre, 230 East Fifth Street, St. Paul, MN, 55101-1634, 651-602-1343.

Interpreted TM Satellite Imagery for the Metropolitan Counties
This 10-category data set was created by the University of Minnesota's Department of Forestry using imagery from June 16 and September 4, 1991. A multitemporal classification using TM bands 1-5 was used to classify 'neighborhoods' of pixels which were similar into a single class. The accuracy measured was 91% for the ten classes and 95% for five classes (developed, cropland, forest, wetland, and water). An online metadata record is under development. For more information, contact Dr. Marvin Bauer, Dept. of Forest Resources, University of Minnesota, 1530 N. Cleveland Avenue, St. Paul MN 55108, (612) 624-3703, mbauer@forestry.umn.edu .

Olmsted County
This 37 category land use data set was developed by the Olmsted County Planning Department. An online metadata record is under development. For more information, contact Jan Chezick, Olmsted Planning Department, 2122 Campus Drive S.E., Rochester, MN 55904, (507) 285-8628.

Beltrami and Clearwater Counties
The original MLMIS40 1969 land use classification for these counties was updated in 1987 by the Beltrami and Clearwater Soil and Water Conservation Districts, using air photo interpretation. For more information, see documentation at: http://lucy.lmic.state.mn.us/metadata/bsuluse.html or contact LMIC.

Camp Ripley and Beltrami Island State Forest
This data set covers two areas of Minnesota that had not been included in other recent land use inventories. Camp Ripley is a military reservation in northern Morrison County, and Beltrami Island State Forest is in southeastern Roseau County. Classification was done using multi-temporal interpretation of Landsat TM imagery from 1992-3 and 1996. An online metadata record is under development. For more information, contact LMIC.

Minnesota Land Use/Land Cover 1969 (part of MGC100 data set)
MGC100 is a statewide data set that consists of approximately 400 raster-formatted data layers. The data themes cover a wide range of physical and biological variables along with administrative, political, sociodemographic, and transportation data. One of the themes is Minnesota Land Use/Land Cover, 1969. It uses 9 land use/land cover classes interpreted from high altitude aerial photography and recorded for each 40-acre parcel in the state. For more information, see the following websites:
http://lucy.lmic.state.mn.us/metadata/mgc100.html or
http://www.mnplan.state.mn.us/EPPL7 or contact LMIC.

Section 2 Data Quality Information - - - - - - Go back to top

Attribute Accuracy No more accurate than the original attribute coding. See documentation for each source data set (listed in the 'Associated Datasets' element).

Logical Consistency Data are stored within a valid ARC/GRID data structure.

Completeness A lookup table (lulookup.dbf) details the translation between the original legend categories and the 8 category system. Also, see 'Completeness' element in metadata records for each source data set (listed in the 'Associated Datasets' element).

Horizontal Positional Accuracy No more accurate than the original horizontal positional accuracy. See metadata records for each source data set (listed in the 'Associated Datasets' element). No formal statistical tests have been conducted on this data set. Additional error was introduced during the gridding process described in the Lineage element.

Vertical Positional Accuracy Not applicable.

Lineage Land Use Data Sources:

Agricultural and Transition Areas
Forested Areas
Interpreted TM satellite imagery for the Twin Cities metro area
Generalized Land Use for the Twin Cities Metropolitan Area (this data set's farmstead category only)
Olmsted County
Beltrami and Clearwater Counties
Camp Ripley and Beltrami Island State Forest

County Boundaries Data Source:
MnDNR's CTYBDNE2 coverage (see documentation at http://carp.dnr.state.mn.us:5000/gis/full_md/ctybdne2cr.html)

DNR's Regional Boundaries Data Source:
DNR Regions coverage (see documentation at http://carp.dnr.state.mn.us:5000/gis/full_md/dnrrgne1cr.html)

MnDNR's Processing Steps:

All land use/cover data was put together by county in raster format using Arc/Info GRIDs. The data that existed as vector datasets (Agriculture and Transition Areas, farmstead category from the Metropolitan Council data set, and Olmsted County) was rasterized to 30 meter by 30 meter cells prior to mosaicing using the THEME menu, Convert to Grid option in ArcView's Spatial Analyst. All county tiles were based on DNR's CTYBDNE2 coverage.

Special Processing for the metro area: Two data sets were used in the metro area. All land use classifications in the interpreted TM satellite imagery data set were used since they more closely matched classifications used in other areas in Minnesota. The one class that was not well-represented in the TM data set was scattered houses so the farmstead class from the Metropolitan Council land use data was incorporated into the TM data. This was done using simple overlay techniques in Spatial Analyst.

Individual county data sets were merged into tiles based on DNR's Administrative Regions. The DNR Administrative regions coverage was derived from the CTYBDNE2 coverage since most regional boundaries are based on county borders.

Each regional landuse/cover grid was then subjected to the following clean-up process. When raster data is mosaiced there are gaps that occur between the tiles where they did not match up perfectly. Typically these gaps are very small, on the order of one or two cells in width. To fill in these gaps, the NIBBLE process in Spatial Analyst was used to replace cells that were offsite by using nearest neighbor rules. Each data set was masked so that only those cells within each region were processed. This is similar to a clip command in a vector GIS system.

Each of the regional data set grids were then mosaiced together using the MERGE request and then cleaned-up using the NIBBLE request as described above.

The resulting landuse/cover grid had one attribute called VALUE. This item contained the attribute codes for each of the different landuse/cover classes from each of the differing coding schemes. Since there were 6 sources for the data and since there were 5 different coding schemes, a new coding scheme had to be developed to maintain data integrity. To accomplish this, the data from different sources was offset in the following fashion:

100 Bemidji State University
200 Department of Natural Resources
300 Manitoba Remote Sensing Centre
400 Olmsted County Planning and Zoning
500 The International Coalition
600 University of Minnesota/Metropolitan Council

Using this coding scheme, every unique data value was preserved. In all but Olmsted County, the datasets were simply offset by the appropriate value. For Olmsted County, where the landuse and cover class values exceeded 100, they were simply numbered sequentially from 1 to 37 and then offset by 400.

A lookup table (lulookup.dbf) was then created with the following fields:
New_code - The new code as it exists in the statewide grid
Orig_code - The Original code as it existed in the source data
Map_code - The codes as they were assigned on the statewide 1990's Land Use and Cover map
Orig_desc - The Original class description
Map_desc - The Class descriptions as shown on the statewide 1990's Land Use and Cover map

This table could be related/joined to the grid table using the VALUE item in the GRID and the NEW_CODE item in the lookup table.

Files for Public Distribution: A file that contained only the NEW_CODE item was created for public distribution. It is available in ArcGRID and EPPL7 raster formats. The lookup table, lulookup.dbf, is provided to show how the detailed legend categories in the original data sets were matched to one of the eight land use categories in this data set.

Source Scale Denominator

Section 3 Spatial Data Organization Information - - - - - - Go back to top

Native Data Set Environment	Arc/INFO GRID
Geographic Reference for Tabular Data	
Spatial Object Type	Raster
Vendor Specific Object Types	Cell
Tiling Scheme	State

Section 4 Spatial Reference Information - - - - - - Go back to top

Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS80
Horizontal Datum	NAD83
Horizontal Units	Meters
Distance Resolution	Unknown
Altitude Datum	Not applicable
Depth Datum	Not applicable
Cell Width	30
Cell Height	30
UTM Zone Number	15E
Coordinate Offsets or Adjustments	None

Section 5 Entity and Attribute Information - - - - - - Go back to top

Entity and Attribute Overview	1. Urban and rural development Residential, commercial, industrial, cultural and recreational developments and related developments such as power plants, power lines, pipelines, airports, waste treatment facilities, golf courses, farmsteads and feedlots. Associated structures include garages, sheds and landscaped areas. 2. Cultivated land

Areas under intensive cropping or rotation, including fallow fields and fields seeded for forage or cover crops that exhibit linear or other patterns associated with current tillage

3. Hay/Pasture/Grassland
Areas covered by grasslands and herbaceous plants; these may contain up to one-third shrub and tree cover. Some areas may be used as pastures and mowed or grazed. Included are fields that show evidence of past tillage but now appear to be abandoned and grown over with native vegetation or planted with a cover crop.

4. Brushland
Areas with a combination of grass, shrubs, and trees in which deciduous or coniferous tree cover comprises from one to two-thirds of the area, or shrub cover comprises more than one-third of the area. These areas are often found adjacent to hay/pasture/grassland or forested areas and vary greatly in shape and extent.

5. Forested
Areas where two-thirds or more of the total canopy cover is composed of predominantly woody deciduous and coniferous species and areas of regenerated or young forest where commercial timber has been completely or partially removed by logging, other management activities or natural events; includes woodlots, shelterbelts and plantations.

6. Water
Permanent bodies of water such as lakes, rivers, reservoirs, stock ponds and open water areas where photo evidence indicates that the areas are covered by water the majority of the time

7. Bog/Marsh/Fen
Grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophilic vegetation such as cattail and rushes. These areas include wetlands with lowland coniferous forest and peat-covered or peat-filled depressions with a high water table; areas are often interspersed with channels or pools of open water.

8. Mining
Areas stripped of topsoil revealing exposed substrate such as sand or gravel, including gravel quarries, mine tailings, borrow pits and rock quarries. Included are areas that lack appreciable soil development or vegetation cover such as rock outcrops, sand dunes or beaches.

Entity and Attribute Detailed Citation

Section 6 Distribution Information - - - - - - Go back to top

Publisher Minnesota Land Management Information Center (LMIC)

Publication Date 1999

Contact Person Information
Nancy Rader, Data Distribution and Coordination Specialist
Minnesota Land Management Information Center (LMIC)
658 Cedar Street, 330 Centennial Building

St. Paul, MN 55155
Phone: 651-296-1211
FAX: 651-296-1212
E-mail: clearinghouse@mnplan.state.mn.us

Distributor's Data Set Identifier MNLUSE8

Distribution Liability

DISTRIBUTION LIABILITY STATEMENT
For data delivered on-line or by physical media by
The Land Management Information Center, MN Planning
November 1998

Limitations: Although extensive effort has been made to produce error free and complete data, all geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. You should consult available data documentation (metadata) for these particular data to determine their limitations and the precision to which they depict distance, direction, location or other geographic characteristics. These data may be subject to periodic change without prior notification.

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Data Delivered on Electronic Media: If these data have been requested from LMIC on magnetic media, CD-ROM or any other physical media, LMIC will deliver this product in the computer-readable format agreed upon with the requestor. LMIC will re-issue these data if they are determined unreadable by correctly adjusted computer input devices, or when the medium is delivered in a damaged condition. Requests for re-issue of this digital data product must be made within 30 days of the date shipped from LMIC.

Transfer Format Name Arc/INFO GRID or EPPL7

Transfer Format Version Number

Transfer Size GRID: 46 megabytes (22 mb zipped); EPPL7: 40 mb. (19 mb zipped).

Ordering This data set is distributed on the internet by clicking below after Online Linkage.

Instructions	Doing so will tell your browser to start downloading a self-extracting 'ZIP' file which will contain the following: - An Arc/INFO Grid file - A default color palette (.clr) for use when displaying in software such as ArcView - Documentation (.htm) file for the dataset - NOTICE.RTF, an important notice about this data set that can be read by most word processing software, and an ascii text version of the same notice (NOTICE.TXT) After downloading this self-extracting 'zip' file (which will have an 'exe' extension), simply execute (run) the file. (For example, you can double click it from Windows Explorer or File Manager). Doing this will automatically extract the files described above. You can then delete file types that you do not need, if any. (The file is also available in EPPL7 format. Go to ftp://ftp.lmic.state.mn.us/pub/data/phys_biol/landuse and download the luse8epp.exe file. This format will also soon be available on a CD data collection; contact LMIC for more information.)
Online Linkage	Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" above.

Section 7 Metadata Reference Information - - - - - - Go back to top

Metadata Date	09/16/1999
Contact Person Information	Nancy Rader, Data Distribution and Coordination Specialist Minnesota Land Management Information Center (LMIC) 658 Cedar Street, 330 Centennial Building St. Paul, MN 55155 Phone: 651-296-1211 FAX: 651-296-1212 E-mail: clearinghouse@mnplan.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.2
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

This page last updated 09/16/1999.

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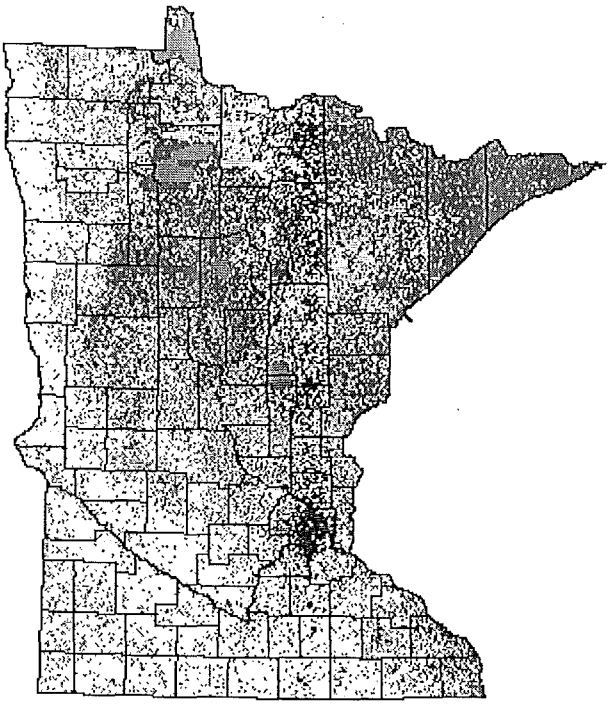
MINNESOTA LAND USE AND COVER
1990s CENSUS OF THE LAND

Select a county by clicking on the map



Legend

- Urban and rural development
- Cultivated land
- Hay/pasture/grassland
- Brushland
- Forested
- Water
- Bog/marsh/fen
- Mining

About the data and application

>

Transfer interrupted!

>Hay/pasture/grassland

Description	Acreage	Percent of state	Description	Acreage	Percent of state
Urban and rural development	1,472,267	2.7	Forested	14,434,482	26.7
Cultivated land	22,694,200	42.0	Water	3,211,643	5.9
4,977,451	9.2	bog/marsh/fen	5,728,056	10.6	
Brushland	1,326,796	2.5	Mining	147,175	0.3
			State total	**53,992,070**	**100.0**

PLANNING

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St. Paul, MN 55155

PLANNING
LAND MANAGEMENT INFORMATION CENTER
MINNESOTA PLANNING
NEW
PUBLICATIONS
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LMIC SERVICES
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EPPL7 AND EPIC
GEODATA CLEARINGHOUSE
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SPATIAL DATA STANDARDS
CONTACT US
ABOUT US
WEB HELP

MINNESOTA LAND USE AND COVER

Viewers can explore land use for the entire state and individual counties through an interactive mapping tool and statistical profiles of land use data collected during the 1990s. The land use statistics were generated to generally correspond to the published statewide map titled *Minnesota Land Use and Cover: 1990s Census of the Land.* The map was produced by the Department of Natural Resources using data from seven separate land use and cover inventories to create a consistent, statewide inventory.

An eight-category scheme was developed in order to merge data from varying time periods, land use and cover definitions, data collection techniques and data resolutions. Data was compiled from several inventories including those of the Manitoba Remote Sensing Centre; the International Coalition; Metropolitan Council and University of Minnesota; Bemidji State University Geography Department and Beltrami and Clearwater Counties; Rochester-Olmsted County Planning Department; and the Minnesota Department of Natural Resources, Forestry Division.

- Category definitions
- How the statistics were generated
- Uses and cautions
- Data documentation
- Application development

Return to state land use and cover map

CATEGORY DEFINITIONS

Urban and rural development residential, commercial, industrial, cultural and recreational developments and related developments such as power plants, power lines, pipelines, airports, waste treatment facilities, golf courses, farmsteads and feedlots. Associated structures include garages, sheds and landscaped areas.

Cultivated land areas under intensive cropping or rotation, including fallow fields and fields seeded for forage or cover crops that exhibit linear or other patterns associated with current tillage

Hay/pasture/grassland areas covered by grasslands and herbaceous plants; these may contain up to one-third shrub and tree cover. Some areas may be used as pastures and mowed or grazed. Included are fields that show evidence of past tillage but now appear to be abandoned and grown over with native vegetation or planted with a cover crop.

Brushland areas with a combination of grass, shrubs, and trees in which deciduous or coniferous tree cover comprises from one to two-thirds of the area, or shrub cover comprises more than one-third of the area. These areas are often found adjacent to hay/pasture/grassland or forested areas and vary greatly in shape and extent.

Forested areas where two-thirds or more of the total canopy cover is

composed of predominantly woody deciduous and coniferous species and areas of regenerated or young forest where commercial timber has been completely or partially removed by logging, other management activities or natural events; includes woodlots, shelterbelts and plantations.

Water permanent bodies of water such as lakes, rivers, reservoirs, stock ponds and open water areas where photo evidence indicates that the areas are covered by water the majority of the time

Bog/marsh/fen grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophilic vegetation such as cattail and rushes. These areas include wetlands with lowland coniferous forest and peat-covered or peat-filled depressions with a high water table; areas are often interspersed with channels or pools of open water.

Mining area stripped of topsoil revealing exposed substrate such as sand or gravel, including gravel quarries, mine tailings, borrow pits and rock quarries. Included are areas that lack appreciable soil development or vegetation cover such as rock outcrops, sand dunes or beaches.

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HOW THE STATISTICS WERE GENERATED

The Minnesota Department of Natural Resources generated the land use statistics through the following process: Data from the statewide map *Minnesota Land Use and Cover: 1990s Census of the Land* was stored by county and matched to the departments version of the state's county borders. The statewide map incorporates the major transportation routes from the Minnesota Department of Transportation's road file rather than being interpreted from Landsat imagery or aerial photography. The process of creating the statewide coverage involved rasterizing all existing vector land use datasets at a resolution of 30 meters squared. The resulting files were mosaiced together to form a single statewide working Arc/Info GRID. The statistics were then generated by crosstabulating DNR's County border data with the Statewide coverage. All processing of vector and raster data was performed using ESRI's ArcView Spatial Analyst Grid processing software.

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USES AND CAUTIONS

This land use map and its corresponding statistics are not directly comparable to other inventories. The Minnesota Land Management Information Center does not warrant the results that may be obtained by using this map. This map and statistics are provided as is, without express or implied warranties, including warranties of merchantability and fitness. In no event will the Land Management Information Center be liable for any consequential, incidental or special damages, including any lost profits or lost savings, even if it has been advised of the possibility of such damages or any claim by any third party.

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DATA DOCUMENTATION

Documentation for the eight-category land use dataset shown here is in the Minnesota Land Use and Cover: 1990s Census of the Land metadata record.

Documentation for the more detailed data sources used to create the 1990's Census of the Land is in the following records (documentation for Olmsted County and for the seven-county Twin Cities area is under development):

- For agricultural and transition areas of the state, see the International Coalition metadata record.
- For forested areas of the state, see the Manitoba Remote Sensing Centre metadata record.
- For Beltrami and Clearwater Counties, go here.

Both the Agricultural and Transition Areas inventory and the Forested Areas inventory were funded by the Legislature as recommended by the Legislative Commission on Minnesota Resources.

A printed, full-color version of the map *Minnesota Land Use Cover: 1990s Census of the Land* ia available for sale from the Minnesota Science Museum bookstore, 651-221-9414. Digital information is available from the Data Services section of the Land Management Information Center.

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APPLICATION DEVELOPMENT

This application was developed by the Land Management Information Center web and applications programmers using MapServer and EPPL7 software utilities. A special thanks to the Department of Natural Resources applications staff who consolidated the original land use inventories and modified the MapServer technology.

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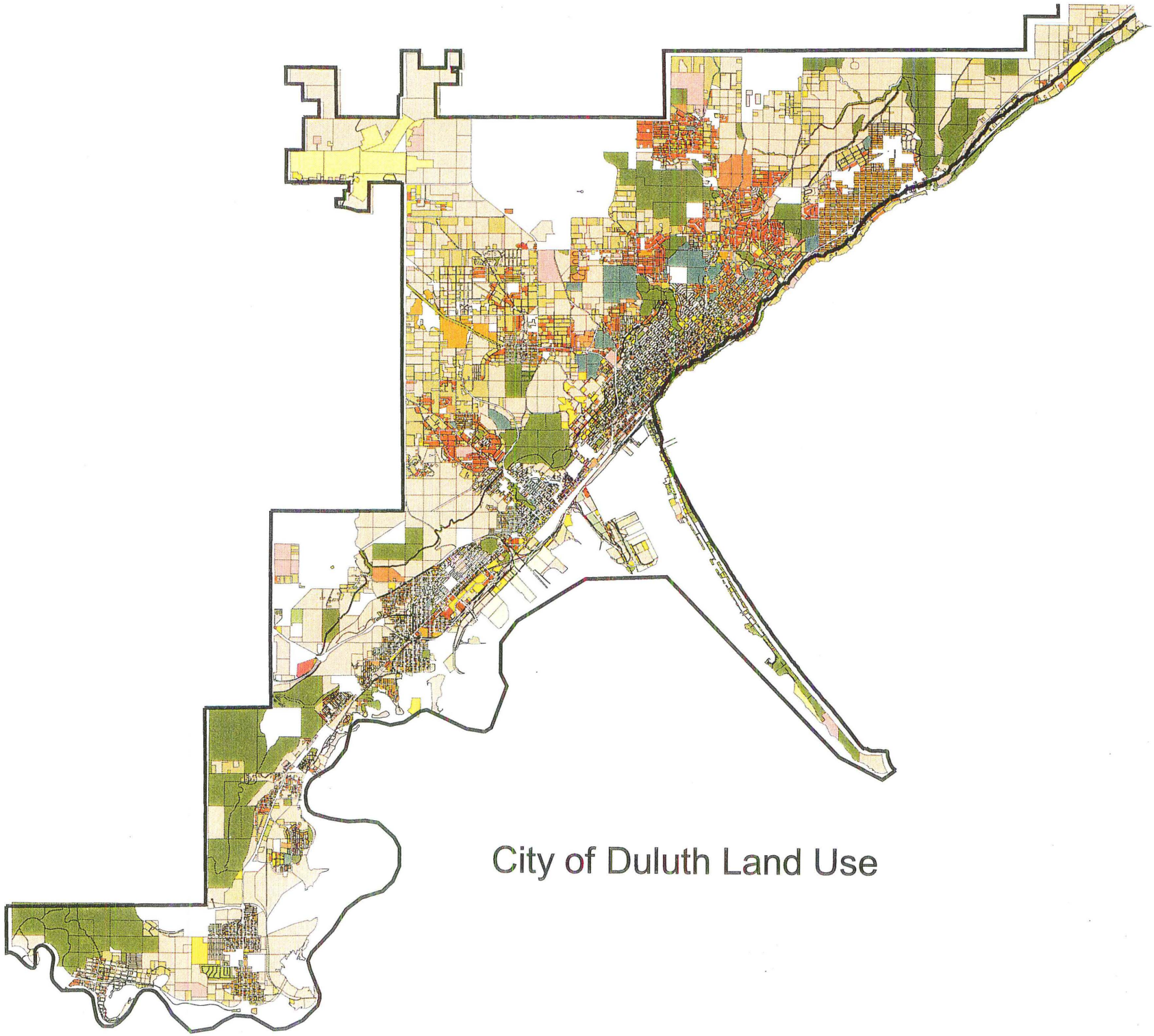


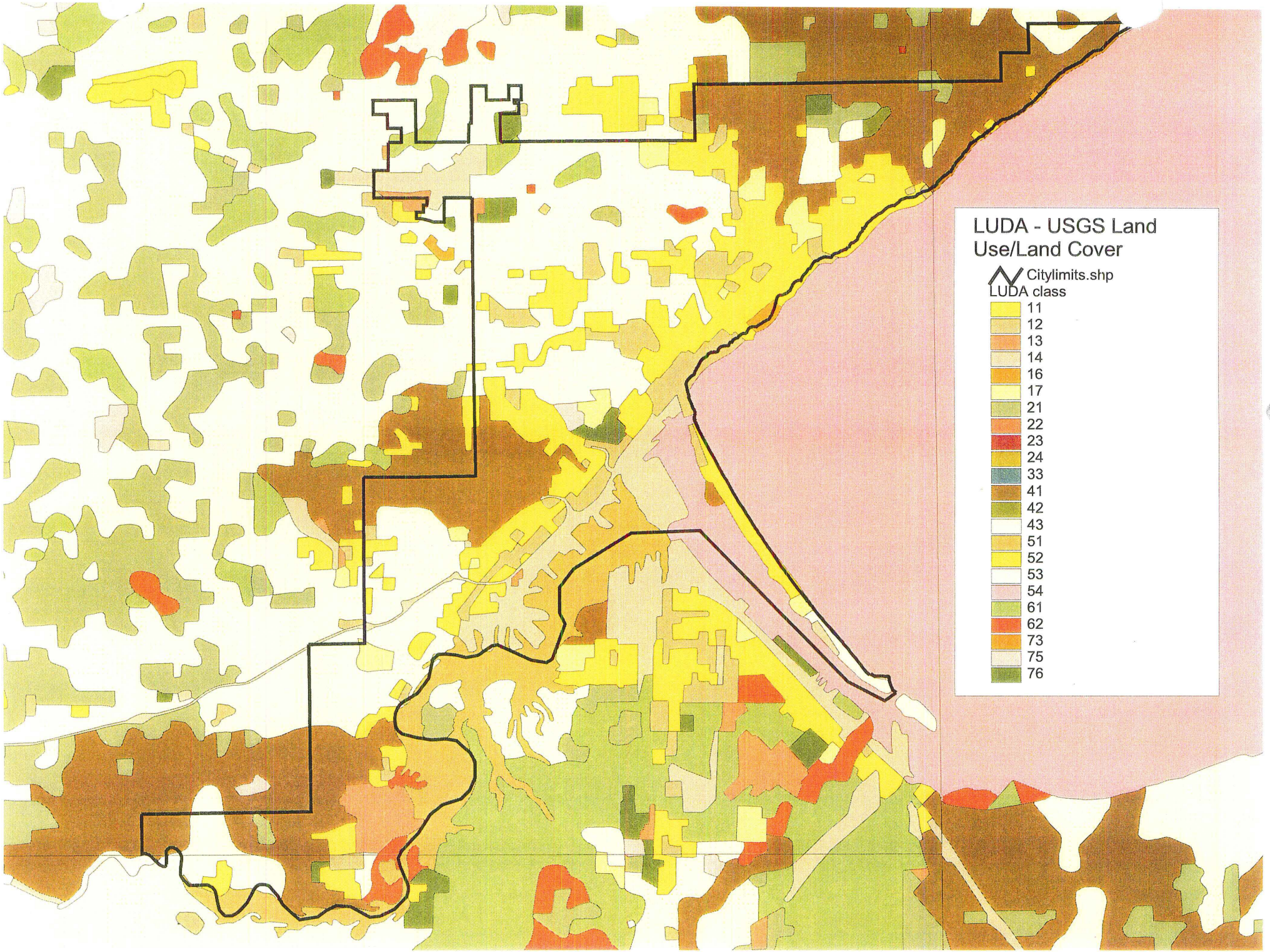
City of Duluth Land Use

CITY OF DULUTH LAND USE

City of Duluth Land Use Categories

Land Use:	Code:	Description:
Low-Density Residential	LR	Single and two-family housing at a density between 0 and 2 units/acre.
Medium-Density Residential with Alleys	MRWA	Single and two-family housing at a density between 2 and 6 units/acre.
Medium-Density Residential without Alleys	MRNA	Single and two-family housing at a density between 2 and 6 units/acre without a built alley adjacent.
High-Density Residential with Alleys	HRWA	Single and two-family housing at a density greater than 6 units/acre with a built alley adjacent.
High-Density Residential without Alleys	HRNA	Single and two-family housing at a density greater than 6 units/acre without a built alley adjacent.
Modular-Home Parks	MOBR	Modular-home parking facilities including the homes, yards, roads, and offices.
Multi-Family Residential	MF	Housing for three or more family units from 1 to 3 stories in height.
High-Rise Residential	HIR	Housing of any density 4 or more stories in height.
Strip Commercial	CST	Commercial areas for which the primary function involves the sale of goods and/or services. This includes the building and the parking lots.
Multi-Use Commercial	CDT	Commercial uses that have incorporated in the same parcel other non-commercial uses, such as apartments above a store.
Shopping Centers	SC	Large single-owner multi-tenant shopping centers and malls. Commercial areas where the related parking lot is at least 2.5 times the size of the building's roof area. The buildings in this land use area are usually surrounded by the parking lot.
Non-Manufacturing Industrial	LI	Those buildings and premises used for the storage and/or distribution of goods awaiting further processing or sale to retailers. This category includes warehouses, and wholesalers, electric substations, reservoirs and other utility buildings.

Manufacturing Industrial	MI	Those buildings and premises which are devoted to the manufacture of products.
Medical and Related Facilities	HOSP	Medical facilities that provide inpatient care and outpatient services. This includes clinics and long-term nursing-care facilities. This does not include dentist and chiropractic offices
Educational Facilities	SCH	Any public or private, primary, secondary or college educational institutional grounds. Includes buildings, playgrounds, athletic fields, roads, parking lots and lawns.
Miscellaneous/Institutional	MISC	Public buildings and government offices, fairgrounds, military facilities, prisons and jails, performance centers, orphanages, group homes, museums, churches, service organizations, and community clubs.
Parks and Recreation Areas	PARK	Outdoor recreational areas including municipal playgrounds, community gardens, picnic facilities, trails, golf courses, and natural areas.
Cemeteries	CEM	Includes cemetery grounds, roads, and buildings.
Undeveloped	OSUD	Lands that are private or publicly owned with no structures and have a complete vegetative cover. This includes vacant lots not owned by an adjacent property.
Harbor	HARB	Land uses related to the shipping of goods over water including grain elevators, bulk storage facilities and warehouses related to water-borne transportation. This also includes marinas.
Airports	AIR	Airport facilities including, terminals, hangars, and airport owned buffers.
Railroad yards	RRYD	Railroad yards and associated buildings.


LUDA - USGS Land Use/Land Cover
Citylimits.shp
LUDA class
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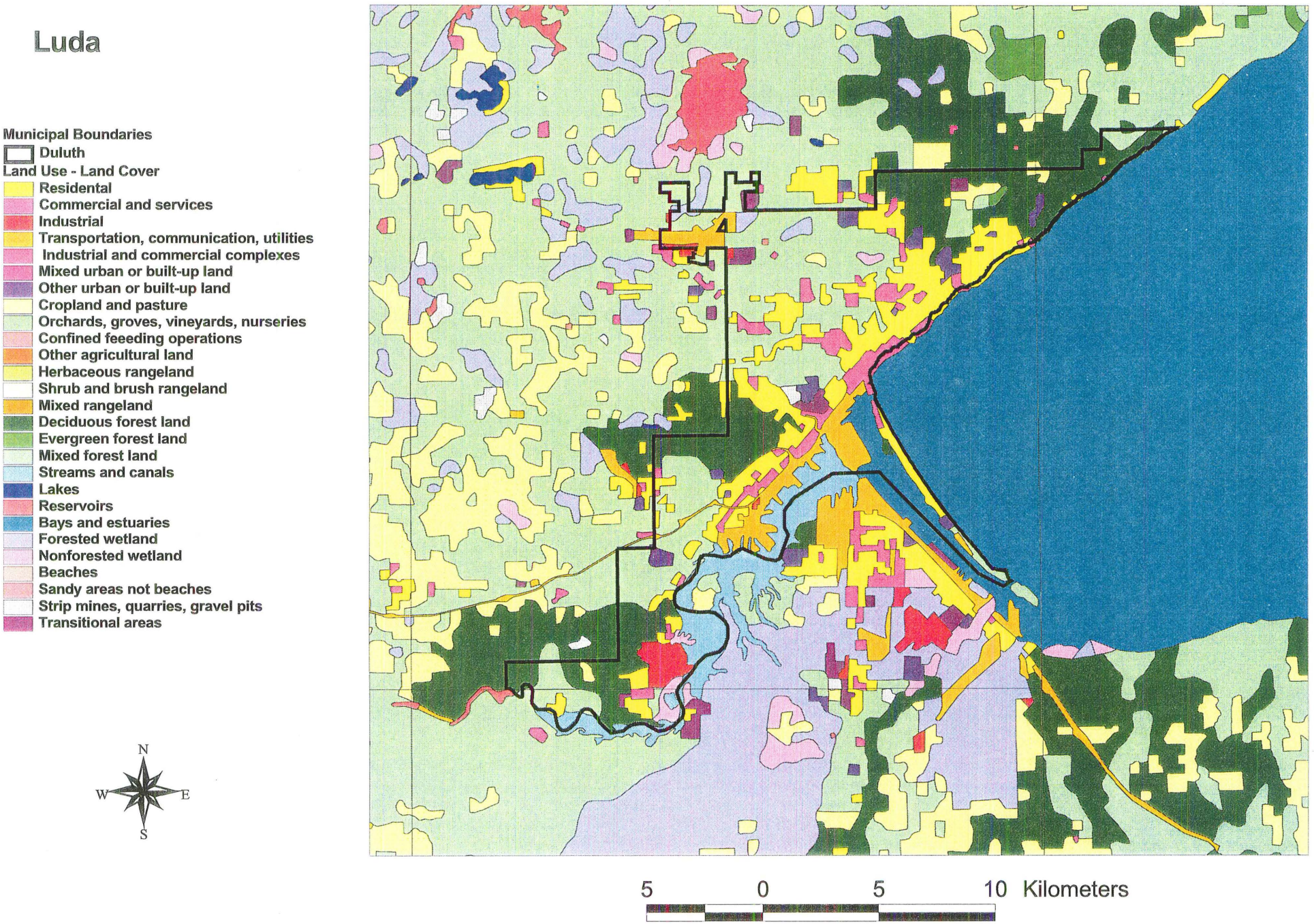
Luda


Municipal Boundaries
Duluth
Land Use - Land Cover
Residental
Commercial and services
Industrial
Transportation, communication, utilities
Industrial and commercial complexes
Mixed urban or built-up land
Other urban or built-up land
Cropland and pasture
Orchards, groves, vineyards, nurseries
Confined feeeding operations
Other agricultural land
Herbaceous rangeland
Shrub and brush rangeland
Mixed rangeland
Deciduous forest land
Evergreen forest land
Mixed forest land
Streams and canals
Lakes
Reservoirs
Bays and estuaries
Forested wetland
Nonforested wetland
Beaches
Sandy areas not beaches
Strip mines, quarries, gravel pits
Transitional areas
N
W
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S
5
0
5
10 Kilometers

LUDA

metadata

Identification_Information:

Citation:
Citation_Information:
Originator: James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer
Publication_Date: 1976
Title: A Land Use and Land Cover Classification System for Use with Remote Sensor Data
Publication_Information:
Publication_Place: Reston, Virginia
Publisher: U.S. Geological Survey Professional Paper 964
Online_Linkage: ftp://nmdpow9.er.usgs.gov/public/lulcpp964
Citation_Information:
Originator: U.S. Geological Survey
Publication_Date: 1990
Title: USGeoData 1:250,000 and 1:100,000 Scale Land Use and Land Cover and Associated Maps Digital Data
Publication_Information:
Publication_Place: Reston, Virginia
Publisher: U.S. Geological Survey
Online_Linkage: ftp://nmdpow9.er.usgs.gov/public/lulcguide

Description: This is land use/ land cover digital data collected by USGS and converted to ARC/INFO by the EPA. This data is useful for environmental assessment of land use patterns with respect to water quality analysis, growth management, and other types of environmental impact assessment. Use may be limited due to currency.

Abstract:

Land use and land cover data LU/LC collected by the USGS NMD is useful for environmental assessment of land use patterns with respect to water quality analysis, growth management, and other types of environmental impact assessment.

Data are meant to be used by quadrangle, or among adjacent quadrangles where temporally contiguous. Can be used in any geographic application where intermediate scale land use data are appropriate and the dates are representative.

Each quadrangle of land use data has a different representative date. Date ranges from mid 1970s to early 1980s are common. When joined

togethr
these quadrangles will not likely match along edges due to differences in interpretation and time coverage. Edges of each map file were manually digitized and may not join neighboring maps. If GIRASNEAT program hasbeen applied (see LOG at end) then edges have been mathematically recalculated to join without overlap or gaps in coverage with adjacent maps.

The GIRAS series can include several themes of spatial data. The most common, described here, is the land use and land cover data. Land use was mapped and coded using the Anderson classification system (Anderson others,1976) which is a hierarchical system of general (level 1) to more specific (level 2) characterization. Some agencies have taken this to a level 3 classification -- but this has not been done in the GIRAS series.

The salient attribute managed for this polygon data set in the polygon attribute table (PAT) is the column named LUCODE containing the Anderson level 2 classification. The first digit represents the level one value and the second digit (ones place) represents the subdivision of the level 1 or level 2 value.

The Anderson land use codes are:
1 Urban or built-up land
11 Residental
12 Commercial and services
13 Industrial
14 Transportation, communication, utilities
15 Industrial and commercial complexes
16 Mixed urban or built-up land
17 Other urban or built-up land
2 Agricultural land
21 Cropland and pasture
22 Orchards, groves, vineyards, nurseries, and ornamental horticultural
23 Confined feeeding operations

24 Other agricultural land
3 Rangeland
31 Herbaceous rangeland
32 Shrub and brush rangeland
33 Mixed rangeland
4 Forest land
41 Deciduous forest land
42 Evergreen forest land
43 Mixed forest land
5 Water
51 Streams and canals
52 Lakes
53 Reservoirs
54 Bays and estuaries
6 Wetland
61 Forested wetland
62 Nonforested wetland
7 Barren land
71 Dry salt flats
72 Beaches
73 Sandy areas not beaches
74 Bare exposed rock
75 Strip mines, quarries, gravel pits
76 Transitional areas
8 Tundra
81 Shrub and brush tundra
82 Herbaceous tundra
83 Bare ground
84 Wet tundra
85 Mixed tundra
9 Perennial snow or ice
91 Perennial snowfields
92 Glaciers

GIRAS files are received by the USGS in 9-track ASCII format, one file per quadrangle. Files are loaded onto the hard disk of the computer from tape. Data are then processed with the GIRASARC2 program written in Arc Macro Language, part of the ARC/INFO geographic information system. This program was written by the USGS Water Resources Division to process the data into a consistent ARC/INFO format with a minimum of intervention.

This GIRASARC2 AML <ftp://ftp.epa.gov/pub/spdata/EPAGIRAS/meta/gi

rasarc2.aml>
program does the following:
-- Converts the GIRAS data to ARC/INFO
-- Reconstructs topology, creating line and polygon features
-- Transforms the coverage into UTM and then, optionally into Albers
Equal Area, using the registration points listed in the GIRAS file
-- Notes transformation error, writing it to the bottom of the narrative
file.
-- Generates a synthetic neatline based on the mathematically-determined
corners of the map
-- Loads available documentation into a series of companion documentation
files with each data set.
-- Data may then be clipped against or extended to the synthetic neatline
for ease in merging adjacent maps at a later date

A GIRASNEAT AML <ftp://ftp.epa.gov/pub/spdata/EPAGIRAS/meta/girasneat.aml>
program does the following:
--standardize processing of coverages after use of girasarc2 AML,
--clips in-cover with neatline cover,
--dissolves polygon boundaries between polygon with the same item attribute
--snaps exterior arcs to the arcs of the neatline cover with a tolerance of
40 meters

Original conversion from GIRAS to ARC (see LOG for date and user ID)

Data are reviewed visually by the user responsible for executing the
GIRASARC2 program.

The GIRASARC2 and GIRASNEAT programs were executed in Arc Macro Language
to create this data set. The DOCUMENT AML (version 1.0) was used to
manage the documentation and create this metadata file.

Purpose: To convert the GIRAS data into EPA's standard Geographic Information System (GIS) called ARC/INFO software from ESRI.

```
   Time_Period_of_Content:
     Time_Period_Information:
       Range_of_Dates/Times:
         Beginning_Date: 1977
         Ending_Date: early 1980s
     Currentness_Reference: publication date

   Status:
     Progress: complete
     Maintenance_and_Update_Frequency: unknown

   Spatial_Domain:
     Bounding_Coordinates:
       West_Bounding_Coordinate: -125.0000
       East_Bounding_Coordinate: -66.0000
       North_Bounding_Coordinate: 50.0000
       South_Bounding_Coordinate: 24.0000

   Keywords:
     Theme:
       Theme_Keyword_Thesaurus: none
       Theme_Keyword: land
       Theme_Keyword: landuse
       Theme_Keyword: landcover
       Theme_Keyword: GIRAS
       Theme_Keyword: digital
       Theme_Keyword: geographic
     Place:
       Place_Keyword_Thesaurus: none
       Place_Keyword: United States (US) (USA)
       Place_Keyword: conterminous United States (CONUS)

   Access_Contraints: none
   Use_Contraints: none. Acknowledgement of the U.S. Environmental Pro
tection
   Agency would be appreciated.

   Browse_Graphic:
     Browse_Graphic_File_Name: http://www.epa.gov/nsdi/quadsusa.gif
     Browse_Graphic_File_Description: This graphic shows the outline o
f CONUS
     and the outline of the 450 plus 1:250,000 scale (1 degree latitud
e by
     2 degrees longitude) land use/land cover quadrangles.
     Browse_Graphic_File_Type: GIF
     Browse_Graphic_File_Name: http://www.epa.gov/nsdi/thief.gif
     Browse_Graphic_File_Description: This graphic shows the outline o
f the
```

land use/land cover classification polygons for the Thief River Falls
quadrangle in northwestern Minnesota.
Browse_Graphic_File_Type: GIF
Browse_Graphic_File_Name: http://www.epa.gov/nsdi/lucode.gif
Browse_Graphic_File_Description: This graphic shows the outline of the
land use/land cover classification polygons and the classification code
identifying each polygon.
Browse_Graphic_File_Type: GIF

Native_Data_Set_Environment: GIRAS files were received from the USGS on
9-track ASCII formatted tape, one file per quadrangle. These tape files
were transferred to an IBM390 computer with several gigabytes of magnetic
disk. Each quadrangle file was then transferred using file transfer protocol
(FTP) on the Internet to a Data General 5240 UNIX server to be processed. The
processing was done with the GIS software ARC/INFO version 6. The processed
datasets were then FTP transferred to a Data General 9500 server for public
access using a WWW server Mosaic version 2.1 software.

Data_Quality_Information:

Logical_Consistency_Report: Polygon and chain-node topology present.

Completeness_Report: See Data Set Description Section

Lineage: Example of the GIS process for the Kenora Quadrangle.
Process_Step:
Process_Description: GIRASARC KENORA TMPCOV
Process_Date: 19930426
Process_Time: 1124
Process_Description: BUILD TMPCOV POLY
Process_Date: 19930426
Process_Time: 1124
Process_Description: CREATE KENLL
Process_Date: 19930426
Process_Time: 1124
Process_Description: PROJECT COVER KENLL /EXDISK2/ED/GIRASNEW/WORK/KEN

```
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: TRANSFORM TMPCOV /EXDISK2/ED/GIRASNEW/WORK
/KEN
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: RENAME KEN KENU
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: PROJECT COVER KENU KEN
          Process_Date:  19930426
          Process_Time:  1126
        Process_Description: BUILD KEN POLY
          Process_Date:  19930426
          Process_Time:  1126
        Process_Description:   GIRASDOCUMENT KEN ED
          Process_Date:  19930426
          Process_Time:  1127
        Process_Description: GIRASARC2 KENORA KEN ALBERS -96 00 00 ED
          Process_Date:  19930426
          Process_Time:  1127
        Process_Description: CLIP KEN KENNL XXCOV POLY 1
          Process_Date:  19930426
          Process_Time:  1133
        Process_Description: GIRASARC KENORA TMPCOV
          Process_Date:  19930426
          Process_Time:  1124
        Process_Description: BUILD TMPCOV POLY
          Process_Date:  19930426
          Process_Time:  1124
        Process_Description: CREATE KENLL
          Process_Date:  19930426
          Process_Time:  1124
        Process_Description: PROJECT COVER KENLL /EXDISK2/ED/GIRASNEW/W
ORK/KEN
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: TRANSFORM TMPCOV /EXDISK2/ED/GIRASNEW/WORK
/KEN
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: RENAME KEN KENU
          Process_Date:  19930426
          Process_Time:  1125
        Process_Description: PROJECT COVER KENU KEN
          Process_Date:  19930426
          Process_Time:  1126
        Process_Description: BUILD KEN POLY
```

```
        Process_Date:  19930426
        Process_Time:  1126
      Process_Description:   GIRASDOCUMENT KEN ED
        Process_Date:  19930426
        Process_Time:  1127
      Process_Description: GIRASARC2 KENORA KEN ALBERS -96 00 00 ED
        Process_Date:  19930426
        Process_Time:  1127
      Process_Description: CLIP KEN KENNL XXCOV POLY 1
        Process_Date:  19930426
        Process_Time:  1133
      Process_Description: COPY XXCOV LKE49094
        Process_Date:  19930426
        Process_Time:  1133
      Process_Description: BUILD LKE49094 LINE
        Process_Date:  19930426
        Process_Time:  1134
      Process_Description: ARCEDIT /EXDISK2/ED/GIRASNEW/WORK/LKE49094
        Process_Date:  19930426
        Process_Time:  1140
      Process_Description: BUILD LKE49094 POLY
        Process_Date:  19930426
        Process_Time:  1140
      Process_Description: GIRASNEAT KEN LKE49094 KENNL # SNAP ED
        Process_Date:  19930426
        Process_Time:  1140

Spatial_Reference_Information:

   Horizonal_Coordinate_System_Definition:
     Planar:
       Map_Projection:
         Map_Projection_Name: Albers Conical Equal Area
         Map_Projection_Parameters:
         1st standard parallel is 29 degrees, 30 minutes, 0 seconds
         2nd standard parallel is 45 degrees, 30 minutes, 0 seconds
         central meridian is -96 degrees, 0 minutes, 0 seconds
         latitude of projection origin is 23 degrees, 0 minutes, 0 sec
onds
         false easting is 0 meters
         false northing is 0 meters
     Geodetic_Model:
       Horizontal_Datum_Name: North American Datum of 1927
       Ellipsoid_Name: Clarke 1866

Entity_and_Attribute_Information:

   Detailed_Description:
```

```
    Entity_Type:
      Entity_Type_Label: name.PAT where "name" is a user supplied cha
racter
      string.
      Entity_Type_Definition: Standard ARC/INFO polygon attribute tab
le.
      Entity_Type_Definition_Source: GIRAS digital data
    Attribute:
      Attribute_Label: AREA
      Attribute_Definition: Area of polygons
      Attribute_Definition_Source: computed
      Attribute_Domain_Values:
        Range_Domain:
          Range_Domain_Minimum: positive real number almost zero but
not zero
          Range_Domain_Maximum: positive real number but no larger th
an the
          area of the quadrangle in square meters.
        Attribute_Units_of_Measure: square meters
      Attribute_Label: PERIMETER
      Attribute_Definition: Perimeter of polygons
      Attribute_Definition_Source: computed
      Attribute_Domain_Values:
        Range_Domain:
          Range_Domain_Minimum: positive real number almost zero but
not zero
          Range_Domain_Maximum: positive real number but no larger th
an the
          perimeter of the quadrangle in meters.
        Attribute_Units_of_Measure: meters
      Attribute_Label: name# where "name" is user supplied character
string
      Attribute_Definition: Internal database feature number
      Attribute_Definition_Source: computed
      Attribute_Domain_Values:
        Range_Domain:
          Range_Domain_Minimum: zero
          Range_Domain_Maximum: unique positive integer
        Attribute_Units_of_Measure: none
      Attribute_Label: name-ID where "name" is user supplied characte
r string
      Attribute_Definition: User assign polygon identification number
      Attribute_Definition_Source: computed
      Attribute_Domain_Values:
        Range_Domain:
          Range_Domain_Minimum: one
          Range_Domain_Maximum: unique positive integer
        Attribute_Units_of_Measure: none
```

```
        Attribute_Label: LUCODE
        Attribute_Definition: Land use classification code number
        Attribute_Definition_Source: GIRAS
        Attribute_Domain_Values:
          Codeset_Domain:
            Codeset_Name: Anderson land use classification codes
            Codeset_Source: see Publication_Information U.S.G.S. paper
964


Distribution_Information:

   Standard_Transfer_Options:
     Digital_Form:
       Digital_Transfer_Information:
         Format_Name: ARCE
         File_Decompression_Technique: GNU utility gzip
       Digital_Transfer_Option:
         Online_Option:
           Computer_Contact_Information:
             Network_Adress:
               Network_Resource_Name:
               <URL:ftp://ftp.epa.gov/pub/spdata/EPAGIRAS>
     Fees: The online option is available at no charge.


Metadata_Reference_Information:

   Metadata_Date: 7/11/96
   Metadata_Contact:
     Contact_Information:
       Contact_Person_Primary:
         Contact_Person: Edward Partington
         Contact_Organization: U.S. Environmental Protection Agency
       Contact_Organization_Primary:
         Contact_Position: Computer Specialist
         Contact_Address:
           Address_Type: mailing address
           Address: mailcode 3408, 401 M St. SW
           City: Washington, DC
           State: DC
           Postal_Code: 20460
           Country: USA
         Contact_Voice_Telephone: (202) 260-3106
         Contact_Facsimile_Telephone: (202) 401-8390
         Contact_Electronic_Mail_Address: partington.ed@epamail.epa.go
v
   Metadata_Standard_Name: FGDC Content Standard for Digital Geospatia
```

l Metadata
  Metadata_Standard_Version: 6/8/94

Sanborn Insurance Maps
rectified by Tony Kroska
E. MICHIGAN
RAIL ROAD
W. P. HEINBACH
CITY LUMBER YARD
LAKE
AV.
ST.
W. 1st
W. 2nd
1ST AVE. W.
MCKINNON ST.
Scale of Feet

Historic Reconstruction of Property Ownership and Land Uses along the Lower St. Louis River

Debra K. Kellner, Historical Consultant
Text and Database

Tony Kroska, Community GIS, Inc.
GIS, Maps and CDs

Karen Plass, St. Louis River CAC
Coordination and Editing

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October 1999

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The authors would like to acknowledge the assistance and support of a number of agencies, organizations and individuals who helped with this project. This includes, but is not limited to the following: the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (Region V), for providing the funding; Brian Fredrickson (MPCA's project manager), for overall conceptualization and guidance; Pat Collins (Minnesota Department of Natural Resources) and Nan Stokes for review comments and suggestions on the manuscript; and Jerome Blazevic, Tim Leland and Bill Majewski for input on the time-series land use maps.

NOTES ABOUT THE DATABASE, MAPS AND REPORT

Database: The database includes more than 500 property records for the primary project area (the lower St. Louis River from the Duluth and Superior "entries" to Lake Superior upstream to the Fond du Lac dam) from 1870 through 1970.

We anticipated "geo-referencing" each property in the database. This would have tied each one to a specific location on the Earth's surface, so it could have been precisely mapped using Geographic Information System (GIS) software. It was not possible to geo-reference the database, however, because of time constraints. Instead, we developed thematic time-series maps showing historical land ownership and land uses, as those uses are described in the body of this report.

Maps: The three time-series maps developed for this study were based on current shoreline and land/water configurations. This allows users to easily locate historic properties today.

Within the primary study area (extending upstream from each entry and approximately one-quarter mile inland from the river's edge), the primary land use was characterized on a one-half (.65) acre grid for 1890, 1950 and 1970.

The maps were printed in two sizes. In addition to the 11 inch by 17 inch maps that are bound in this report, a set of large time-series maps (1:1750 in scale and roughly thee feet by four feet in size), showing more detail, was provided to the Minnesota Pollution Control Agency. The St. Louis River Citizens Action Committee (CAC) also has a set of the large maps. In addition to being printed, electronic versions of the time-series land use maps are included with complete copies of this report.

Report: There are two versions of this report:

- The complete version includes the printed database and a compact disk containing the searchable database and the electronic GIS files.
- The shorter version includes a computer diskette with the searchable database, but no printed database and no GIS files. (GIS files are available upon request).

The complete version of this report includes, on the compact disk, a blown-up image of Canal Park, showing the 1888 Sanborn Insurance map overlaid on the 1991 Digital Ortho Quad (aerial photograph). This image demonstrates the potential that GIS technology offers in providing a precise picture of historic land use and land ownership. Getting such detail for the entire project area was beyond the scope of this study. However, due to economies of scale, all of the historic Sanborn Insurance maps have been scanned, and could become the basis for some valuable follow-up work.

PREFACE

This project was conducted to identify potential pollution problems associated with historic property ownership and related land uses along the lower St. Louis River. It supplements and updates the historic land use information that was published in the St. Louis River System Remedial Action Plan (RAP), Stage One, in April 1992 (especially Table III.2, pp. III-12 through III-16). This report does not attempt to repeat, supplement or update the entire Stage One document.

Anyone interested in a more complete summary of the wide variety of activities that have impacted the St. Louis River should consult the Stage One document, which was published by the MPCA and the Wisconsin Department of Natural Resources in 1992. Copies are available from the MPCA office in Duluth or from the St. Louis River CAC.

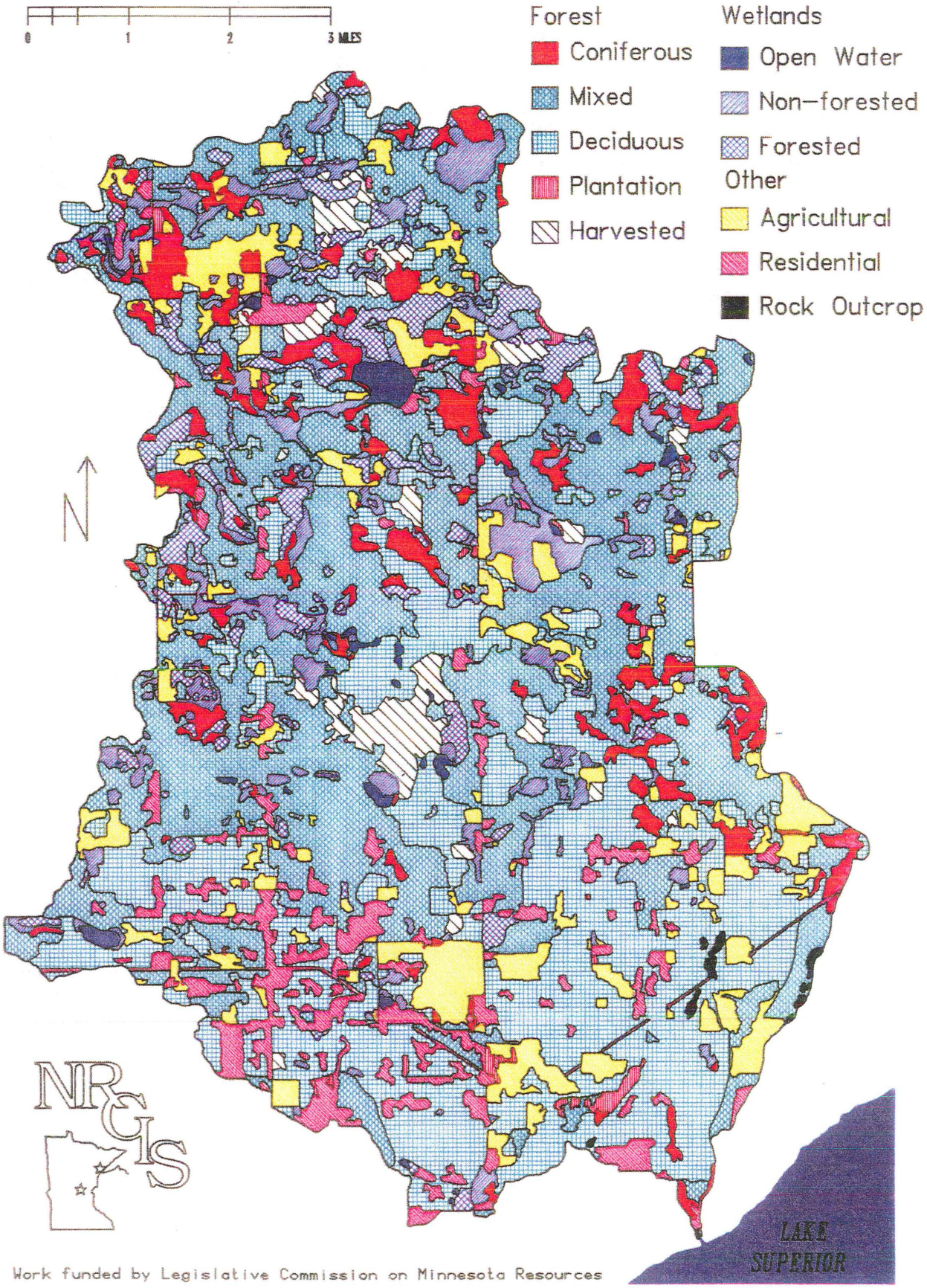
INTRODUCTION

The history and development of the lower St. Louis River over the past one hundred years is most easily understood by charting the evolution of the businesses and industries that were established on its shores. During the later decades of the nineteenth century and the early decades of the twentieth century, the people of Duluth, Minnesota, and Superior, Wisconsin, played a significant role in the development of the river. The population growth of these two port cities coincided with the emerging transshipment industry that was developing along the mouth of the St. Louis River and Lake Superior. As a result of this development, inevitable and significant changes occurred along the shores of the river. Physical alterations have presented a condition of lasting effect that in many cases have adversely affected the environmental integrity of the land and water.

Successful cleanup of the St. Louis River requires an understanding of the region's human use. Past waste disposal practices that may continue to leach pollutants into groundwater could render sediment remediation or other environmental cleanup efforts ineffective. Additionally, construction activities could disturb unknown buried wastes and release toxic pollutants. Historic research can help to identify potential problem areas and the parties that may have contributed to environmental contamination, and may assist in future site remediation.

LESTER RIVER WATERSHED

Land Use Classifications



Work funded by Legislative Commission on Minnesota Resources

LAND USE AND WATER RESOURCES IN THE MINNESOTA NORTH SHORE DRAINAGE BASIN

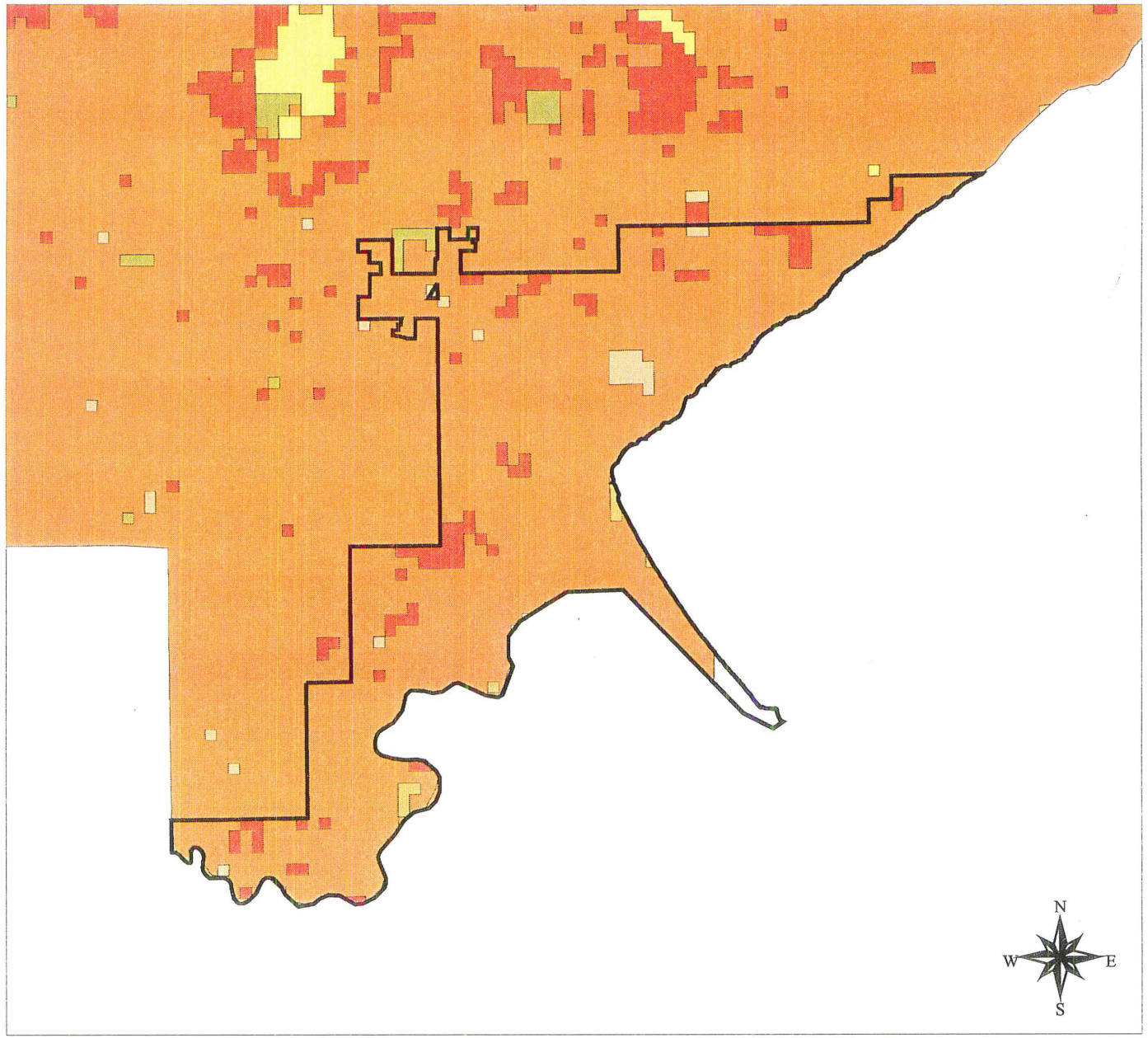
Carol A. Johnston, Brian Allen, John Bonde,
Jim Salés, and Paul Meysembourg

Natural Resources GIS Laboratory (NRGIS)

NRRI Technical Report
NRRI/TR-91/07
July 1991

Research funded by the Legislative Commission on Minnesota Resources

GAP Stewardship Ownership



- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

BRW, Inc

GAP Stewardship

This page last update: 02/10/2000 3:08:25 PM
metadata created using Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1	*Identification Information - - - - - - top*
Originator	BRW, Inc
Title	GAP Stewardship
System Name	gapstpy2
Abstract	This database contains land ownership information for the entire state of Minnesota at 1:100,000 scale. Attribute fields describe ownership, administrator, conservation management code, Public Land Survey (PLS) location, and government lot identifiers. Ownership reflects surface features only. Ownership may only be as current as the source information and should not be considered comprehensive for the entire state. Conservation management codes are based upon the owning or administrating entity. Land interest is expressed only when some organization owns or administers more than 50 percent of a forty.
Purpose	The purpose of this data is to provide ownership and administration information for each PLS quarter-quarter section and the amount of conservation management available to biodiversity elements analyzed in the Gap Analysis Project
Time Period of Content Date	1995
Currentness Reference	Date of source material is varable and ranges from 1976 to 1998, although a date range of 1983 to 1985 predominates
Progress	complete
Maintenance and Update Frequency	None Planned
Spatial Extent of Data	Statewide
Bounding Coordinates	E = -89 W = -97.5

N = 49.5
S = 43

Place Keywords Minnesota

Theme Keywords Public Land Survey, PLS, land ownership, land administration, conservation status, gap analysis, GAP

Theme Keyword Thesaurus None

Access Constraints None

Use Constraints This dataset is not intended for site specific work, but for more generalized analysis or reference. Appropriate uses of this data include, but are not limited to, regional or large area planning or analysis, coarse scale impacts of initiatives affecting biodiversity protection, large scale environmental impact, or education. Inappropriate uses include, but are not limited to, establishing exact boundaries of ownership or administration, establishing definite presence or absence of ownership or administration, using this data in lieu of source information for small scale analysis. PLS delineations below the forty level have been arbitrarily generated and cannot be considered in any way accurate.

Contact Person Information

Robert Maki, GIS Database Coordinator
DNR-MIS
500 Lafayette Road
St. Paul, MN 55155-4011
Phone: (651) 297-2329
FAX: (651) 297-4946
E-mail: robert.maki@dnr.state.mn.us

Browse Graphic File Name gapstpy2_sam.gif

Browse Graphic File Description

Associated Data Sets The dataset is built on top of the PLSDVNE2 layer (Mathematically Divided Public Land Survey); also known as the PLSS-TRSQ (by the Land Management Information Center)

Section 2 *Data Quality Information - - - - - - top*

Attribute Accuracy Public Land Survey attribute reference is described in metadata for the PLSDVNE2 data set. Ownership accuracy will vary depending on source information provided. No formal methods were used to verify non-PLS information in this database. No systematic review or correction procedure by source data providers was used for verification. Conflicting ownership claims are retained in the field REMARKS, but these were not resolved. Informal verification of the attributes was done by visually comparing the final information with the source data or maps. Some sources provided current but incomplete information. Several sources provided ownership information with PLS reference, and should be considered accurate as of the time of addition to the database. Conservation management codes were set depending not on individual PLS quarter-quarter sections, but on the administrating entity. This generalization may provide a code inaccurate for a particular parcel, but will provide a reasonably accurate assessment of the type of management practiced. Some ownership may have been omitted if the quarter-quarter section was primarily surface water. If the source database provided acreage less than half of

the quarter-quarter section's area, but this comprised all of the land, it would not be coded into the base layer. Visual checks with known lake boundaries was done to correct this, but should not be regarded as a complete correction. Informal review of data in the Otter Tail county area suggests a significant error rate in the Waterfowl Production Area (WPA) portion of the database.

Logical Consistency Data are topolocially correct using ARC/INFO 7.2.1. All polygons are closed and lines intersect where intended.

Completeness Ownership information is complete for state agencies as recorded in the Bureau of Real Estate Management database (1996). This includes county ownership without specific designation. State ownership from other sources is of varying completeness and vintage. Most federally owned lands are complete but smaller holdings are of older vintage, and may thus not reflect current ownership. Tribal ownership is complete for the state but does not include all federally owned lands held in trust or as reservation land. Privately managed lands are complete for over sixty counties. Difficulty of collecting information prevented this piece from being completed. Included are individuals, groups, or companies owning at least 1000 acres, The Nature Conservancy, and Conservation Reserve Program lands administered by the MN Department of Agriculture. DNR users should note that DNR interests are only represented if more than 50 percent of any given forty is in state land ownership.

Horizontal Positional Accuracy Source township and range lines were tested by the USGS National Mapping Division's Mid-Continent Mapping Center in August of 1993 for two files: Anoka and Battle Lake. The following evaluation was submitted to LMIC on September 1, 1993 in a letter from Mapping Center Chief Merle E. Southern:The positional accuracy of the Minnesota LMIC PLSS data evaluated met most of our recently adopted acceptance/rejection criteria. Tests of three thirty-minute segments all showed standard errors for x and y to be 5-mils [0.005 inch] or less. Tracking test on two segments were generally acceptable -- one line was encountered that was 12-mils off. No deviations of more than 11-mils are allowed. Shaping of linework was acceptable. Lines internal to the sections were arbitrarily generated and should not be treated in any way as authoritative.

Vertical Positional Accuracy Not Applicable

Lineage Using the PLSS-TRSQ layer as a base, stewardship attributes were populated with collected information. Source information was added in one of three methods: a) Source information received as a database with a PLS description was joined to the base layer directly. If acreage was provided with the source data, it was compared to the base layer area to determine if at least half of the quarter-quarter section was accounted for. Attributes in the base layer were coded with information from the source database; b) Source information taken from printed maps was manually entered into a database template and joined to the base layer in the same manner as the databases received; c) Source information received as an Arc/INFO coverage was intersected with the 100k quadrangles. Each base layer quarter-quarter section was compared with the output to determine whether or not it was overlayed by the source information coverage. All quarter-quarter sections with at least half of their area covered by the source information coverage were coded with that ownership information. Quarter-quarter sections comprising more than one polygon were included in this process. Those polygons with less than half of the area covered by the source information coverage were not coded. In cases for which two or more sources claimed to be the primary owners of a quarter-quarter section, a decision was made as to which source would be coded in the attributes. Priority was given depending on the type of source information, in the order of the three

methods listed above. If the conflicting sources were of the same source type, a decision was made with the DNR to determine which should be coded. Conflicting ownership is recorded in the field REMARKS. Specific source data and vintage: US Forest Service, Chippewa National Forest: type c, 1991 US Forest Service, Superior National Forest: type c, 1993; inholdings type b, 1994 US Park Service, Voyageurs National Park: type c, 1996; inholdings type b, 1994 US Park Service, Grand Portage National Monument: type a, current US Park Service, Pipestone National Monument: type a, current US Fish and Wildlife Service: type c, 1993 US Dep't of the Interior, Bureau of Land Management: type c, 1983 with corrections type a, current US Dep't of the Interior, Bureau of Indian Affairs: type b, 1994 Tribal Lands and US-held Trust Lands: type a, 1997 MN Department of Transportation: type c, 1983 MN Department of Military Affairs: type c, Camp Ripley 1997, all others 1983 MN Department of Corrections: type c, 1983 MN Department of Agriculture: type c, 1995 MN Department of Natural Resources: type a, 1996; Scientific and Natural Areas type c, 1997 Counties: type a, 1996; small amount type b, 1994 The Nature Conservancy: types a and c, 1997 Private Lands, listed by county: Aitkin - type b, 1988 Anoka - type b, 1988 Becker - type b, 1995. Beltrami - type b, 1993. Benton - type b, 1997. Big Stone - type b, 1975. Brown - type b, 1976. Carlton - type b, 1997. Cass - type b, 1993. Clay - type b, 1997. Clearwater - type b, 1994. Cook - type b, 1996. Crow Wing - type a, 1997; type b, 1995 Cottonwood - type b, 1997. Dakota - type b, 1991. Dodge - type b, 1990. Douglas - type b, 1993. Goodhue - type b, 1996. Grant - type b, 1997. Houston - type b, 1991. Hubbard - type b, 1992. Isanti - type b, 1995. Itasca - type a, 1997 Kanabec - type b, 1995. Kittson - type b, 1995. Koochiching - type b, 1988; type a, 1996 Lake - type a, 1996 Lake of the Woods - type a, 1996 LeSueur - type b, 1980 Mahnomen - type b, 1976 Marshall - type b, 1990 Mille Lacs - type b, 1995 Morrison - type b, 1994 Mower - type b, 1993 Murray - type b, 1972 Nicollet - type b, 1997 Nobles - type b, 1997 Norman - type b, 1997 Olmsted - type b, 1995 Ottertail - type b, 1994 Pine - type b, 1997 Pennington - type b, 1997 Pipestone - type b, 1977 Polk - type b, 1997 Pope - type b, 1987 Red Lake - type b, 1997 Redwood - type b, 1997 Renville - type b, 1998 Rock - type b, 1977 Roseau - type b, 1977. St. Louis - type a, 1997 Sherburne - type b, 1997. Steele - type b, 1996. Swift - type b, 1988. Todd - type b, 1981. Traverse - type b, 1997. Wabasha- type b, 1994. Wadena - type b, 1977. Waseca - type b, 1997. Washington - type b, 1997. Wilkin - type b, 1997. Winona - type b, 1990. Wright - type b 1996. County Set - aside lands: Crow Wing - type a, 1996 Itasca - type a, 1996 St. Louis - type a, 1997. DNR staff subjected the data to a series of post-processes following the original data delivery from BRW. These included the following: 1) restructuring PLS attribute fields and domains to conform to internal DNR coding standards, 2) reassigining attribute codes of surface water bodies within the statuatory boundaries of the Superior National Forest to be blank (consistent with the rest of the state), 3) matching a version of the DNR land records (April, 1998) to the base data to add additional data that were not captured in the initial project. Additional matches ranged from approximately 30 to 280 additional record matches per 1/2 degree by 1 degree block, 4) restructuring the data into an alternative design thought to better support DNR business processes. None of the DNR processes disrupted the coordinate content of the data in any way.

Source Scale Denominator 100000

Section 3 *Spatial Data Organization Information* - - - - - - *top*

Native Data Set ARC/INFO

Environment	
Geographic Reference for Tabular Data	Not Applicable
Spatial Object Type	Vector
Vendor Specific Object Types	polygons, arcs
Tiling Scheme	q100k

Section 4	*Spatial Reference Information - - - - - - top*
Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980
Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	n/a
Altitude Units	n/a
Depth Datum	n/a
Depth Units	n/a
Cell Width	0
Cell Height	0
Latitude Resolution	0
Longitude Resolution	0
UTM Zone Number	15
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	n/a
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5	*Entity and Attribute Information - - - - - - top*
Entity and Attribute	PLS quarter-quarter sections (forties) attributized with PLS description; major

Overview

ownership category; administering agency code; administering agency name; contact phone number; long name of land unit; source numeric land unit code; management protection status code; remarks field; and flag fields indicating known ownership conflicts, and instances where land owner and steward differ.

Entity and Attribute Detailed Citation

GAP Stewardship

--gapstpy2.pat--

HTML Table

OWNER: Major stewardship category
AGENCY: Administering agency code
AGEN_NAME: Administering entity long name
AREA_CODE: Area Code of Administering Agency Office
PHONE: Local phone number expressed as a real number
OWNER_FLAG: Identifies records of forties where the owner and administrator of the land unit is different. A principal example of this is state-owned tax forfeit lands, which are administered by the county governments within their jurisdictional boundaries.
UNIT: Long name of administrative unit
UNIT_CODE: Numeric unit code provided by contributing agency. These values are not unique within this field.
SUBUNIT: Not implemented
MGMT: Management protection status code
CONFL_FLAG: A field to flag records with conflicting claims to majority ownership
REMARKS: Any remarks, such as conflicting claims, etc.
COUN: Standard two digit county code
TOWN: Three digit township (tier) number
RDIR: Range direction
RANG: Two digit range number
SECT: PLS section number
FORT: A combination of a code for the quarter section and a code for the quarter of the quarter section:
NUM_OF_GLOTS: Number of Government lots occurring within the forty acre size area
GOVT_LOTA: The identifier of the government lot occurring within the forty. The actual number is unique within each section. Sometimes the same identifier is assigned to adjacent forties, indicating that a single government lot with that identifier extends across those forties.
GOVT_LOTB: See description for the GOVT_LOTA field
GOVT_LOTC: See description for the GOVT_LOTA field
GOVT_LOTD: See description for the GOVT_LOTA field
GOVT_LOTE: See description for the GOVT_LOTA field
GOVT_LOTF: See description for the GOVT_LOTA field
GOVT_LOTG: See description for the GOVT_LOTA field
GOVT_LOTH: See description for the GOVT_LOTA field
GOVT_LOTI: See description for the GOVT_LOTA field
GOVT_LOTJ: See description for the GOVT_LOTA field
GLOTMATCH: A geocoding field designed to optimize matches between this data and tabular real estate management records. This field differs from the GEOGLOT field in that forty code values for records that represent government lots are expressed as zero. When using this field to match with land records, care should be taken to ensure that forty codes in government lot records are treated identically. An ARCVIEW tool has been developed to automate this process--contact Tim Loesch at tim.loesch@dnr.state.mn.us.
GEOPARC: REDEFINEd
GEOGLOT: REDEFINEd

GEOFORT: REDEFINEd
GEOSECT: REDEFINEd
GEORANG: REDEFINEd
RANG.DIR: REDEFINEd

Section 6	*Distribution Information - - - - - - top*
Publisher	Minnesota DNR - MIS Bureau
Publication Date	8/11/1998
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	gapstpy2
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO
Transfer Size	860
Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

Section 7	*Metadata Reference Information - - - - - - top*
Metadata Date	8/11/1998
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR - MIS Bureau 500 Lafayette Road Saint Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.1
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

GAP Stewardship

Table Name	Field Name	Begin Column	Definition	Valid Values	Description
gapstpy2.pat					ARC/INFO Polygon Attribut Table
	OWNER	25	3, 3, I		Major stewardship category
				0	Not classified
				127	Federal
				227	Tribal
				327	State, including tax-forfeited lands under county stewardsh
				427	Other Public
				527	Private Conservancy
				627	Private Industrial, more than 1000 acres owned within the affected county
				727	Private Non-Industrial Business or Trust, more than 1000 acres owned within the affected county
				827	County
				927	Other private property
	AGENCY	28	3, 3, I		Administering agency code
				0	Not classified under a major stewardship category
				110	U.S. Forest Service
				120	U.S. Park Service
				130	U.S. Fish and Wildlife Servic
				140	Bureau of Indian Affairs
				150	U.S. Department of the Interi (Other)
				160	U.S. Army Corps of Enginee
				170	Bureau of Land Managemen
				180	Farmer's Home Administrati
				210	Nett Lake Tribe
				220	Fond du Lac Tribe
				230	Grand Portage Tribe
				240	White Earth Tribe
				250	Red Lake Tribe
				260	Bois Fort Band
				270	Minnesota Chippewa Indians other

310	Department of Natural Resources (undifferentiated)
311	DNR Division of Fish and Wildlife
312	DNR Division of Enforceme
313	DNR Division of Forestry
314	DNR Division of Minerals
315	DNR Division of Parks and Recreation
316	DNR Division of Waters
317	DNR Trails and Waterways Unit
330	Department of Military Affai
340	Department of Corrections
350	Department of Transportation
360	(Minnesota) Department of Agriculture (indicates lands that were enrolled in the Conservation Reserve Progra (CRP) for the period ending 1997.
400	Undifferentiated Public Land
500	Undifferentiated Private Conservancy
600	Undifferentiated Private Industrial
700	Undifferentiated Private Non-Industrial
810	County owned-Undifferentiated
811	Tax-Forfeit county administration-undifferentiat (State owned)
812	Tax-Forfeit county administration-State Forest Lands (State owned)
813	Tax-Forfeit county administration-State Park Lands (State owned)
900	Other private property-undifferentiated
999	No administrative code assigned due to lack of information. This code is ofte assigned to lands that are known to be in federal ownership, but for which no administrating agency has be identifed.

AGEN_NAME	31	25, 25, C		Administering entity long name
			A variety of long name conventions are used in this field	For most federal and state lan this is the government agenc name. For county lands, mos are coded with a generic cou name, but some contain a specific county agency. For privately administered lands, this is usually identical to UNIT. Tribal lands are coded with the Tribe, a generic identifier, or with Tribal affiliation for individual owners.
AREA_CODE	56	3, 3, I		Area Code of Administering Agency Office
PHONE	59	8, 8, N, 4		Local phone number express as a real number
OWNER_FLAG	67	1, 1, I		Identifies records of forties where the owner and administrator of the land unit different. A principal exampl of this is state-owned tax forf lands, which are administered by the county governments within their jurisdictional boundaries.
			0	Owner and administrator are the same
			1	Owner and administrator are different
UNIT	68	40, 40, C		Long name of administrative unit
			Multiple Entries	Long name descriptions provided by the contributing agency
UNIT_CODE	108	4, 4, I		Numeric unit code provided contributing agency. These values are not unique within this field.
			(U.S. Forest Service)	
			1	Superior National Forest
			2	Chippewa National Forest
			3	Boundary Waters Canoe Are Wilderness
			(U.S. Park Service)	
			1	Voyageurs National Park
			2	Pipestone National Monume

3	Grand Portage National Monument
(U.S. Fish and Wildlife)	
99	Scientific and Natural Areas
100	Agassiz National Wildlife Refuge
101	Big Stone National Wildlife Refuge
102	Crane Meadows National Wildlife Refuge
103	Hamden Slough National Wildlife Refuge
104	Minnesota Valley National Wildlife Refuge
105	Rice Lake National Wildlife Refuge
106	Rydell National Wildlife Refuge
107	Sherburne National Wildlife Refuge
108	Tamarack National Wildlife Refuge
109	Upper Mississippi Fish
200	Waterfowl Production Area
(Bureau of Indian Affairs)	
1	Prairie Island Reservation
2	Fond du Lac Reservation
3	Grand Portage Reservation
4	Leech Lake Reservation
5	Mille Lacs Reservation
6	Sandy Lake Reservation
7	Upper and Lower Sioux Reservations
8	Vermilion Reservation
9	White Earth Reservation
11	Prior Lake Reservation
12	Nett Lake Reservation
13	Red Lake Reservation
99	Scientific and Natural Areas
100	Other Trust Lands
For state owned lands, the last four	

			digits of the Bureau of Real Estate Management code MGMT_PRG_CODE provided the subunit.	For detailed information on t list, see the MN Department Natural Resources Division o Forestry "Forestry Land File Code Description List."
			For county owned and administered lands, UNIT_CODE is equivalent to the value of COUN.	
SUBUNIT	112	3, 3, I		Not implemented
MGMT1	115	1, 1, I		Management protection statu code
			1	Areas managed to maintain a natural state and within whic natural disturbance events ar allowed to proceed without interference.
			2	Areas generally managed for natural values, but which ma receive uses that degrade the quality of existing natural communities.
			3	Areas for which permanent land cover conversions from natural or semi-natural habita to anthropogenic habitats are generally not permitted, but which may be subject to intensive uses such as commercial forestry.
			4	Areas managed for intensive human uses which result in permanent land cover conversions such as mining o agriculture.
			7	Areas managed for conservation in which no lan cover conversion is permitted
			8	Areas for which some type o conservation management is practiced, but permanent land cover conversion is not prohibited, such as Conservation Reserve Progra lands.

				9	Areas not rated for conversio management status. This category is the default for private or tribal lands.
	CONFL_FLAG	117	1, 1, I		A field to flag records with conflicting claims to majority ownership
				0	No conflicting claims of majority interest identified.
				1	Conflicting majority land interest claims identified during data compilation.
	REMARKS	118	25, 25, C		Any remarks, such as conflicting claims, etc.

CONFL OWN - Conflicting ownership between two or more entities. One listed is the source coded in the record, the other is the conflicting entity. Abbreviations and acronyms are used to list the entities. A number indicates the number of the county from which the information comes (see COUN, above, for details).	
COMB OWN - Two entities each share half of the quarter-quarter section. One listed is the source coded in the record, the other is the conflicting entity. Abbreviations and acronyms are used to list the entities.	

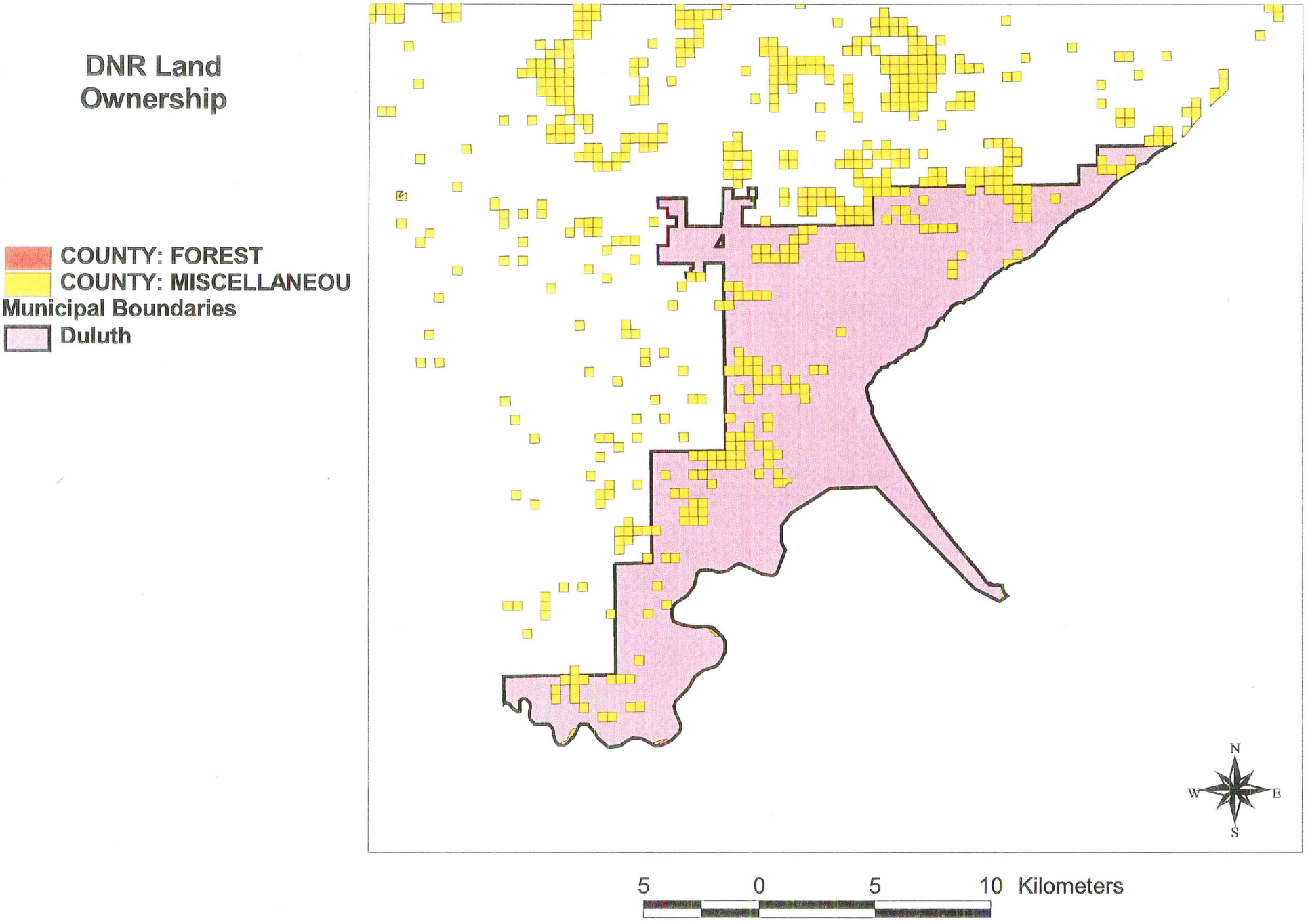
CRP - This code denotes land administered under the MN Department of Agriculture's Conservation Reserve Program.				
DNR LAND_REC POST-PROC indicates that the record was coded during a post-processing step that may have resulted in slightly different long-name descriptions within the UNIT field (when compared with neighboring parcels within the same administrative unit)				
	COUN	143	2, 2, I	Standard two digit county co
			1-87	See description of the table CTYBDNE2.LUT for a cross reference of these code value to county names.
	TOWN	145	3, 3, I	Three digit township (tier) number
			26-71, 101-168	discreet values
	RDIR	148	1, 1, I	Range direction
			0	West
			1	East (Cook County only)
			2	Township 58 1/2 (St. Louis Co.) and Range 42 1/2 (Rose Co.)
	RANG	149	2, 2, I	Two digit range number
				Continuous values. All value are unique with the exception of 1 through 7, which are shared between surveys on either side of the 4th Principa

			1-51	Meridian. In these cases, valu within the "DIR" field are us to differentiate between them Technically, other instances o section number overlap are present on either side of the 5 Principal Meridian as well, allow in these cases, the combination of Township an Range Ids uniquely defines a areas.
SECT	151	2, 2, I		PLS section number
			1-36	Section number values.
FORT	153	2, 2, I		A combination of a code for the quarter section and a cod for the quarter of the quarter section:
			11	NENE
			12	NWNE
			13	SWNE
			14	SENE
			21	NENW
			22	NWNW
			23	SWNW
			24	SENW
			31	NESW
			32	NWSW
			33	SWSW
			34	SESW
			41	NESE
			42	NWSE
			43	SWSE
			44	SESE
NUM_OF_GLOTS	155	2, 2, I		Number of Government lots occurring within the forty acr size area
GOVT_LOTA	157	2, 2, I		The identifier of the government lot occurring within the forty. The actual number is unique within each section. Sometimes the same identifier is assigned to adjacent forties, indicating th a single government lot with that identifier extends across those forties.
GOVT_LOTB	159	2, 2, I		See description for the GOVT_LOTA field

GOVT_LOTC	161	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTD	163	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTE	165	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTF	167	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTG	169	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTH	171	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTI	173	2, 2, I	See description for the GOVT_LOTA field
GOVT_LOTJ	175	2, 2, I	See description for the GOVT_LOTA field
GLOTMATCH	177	14, 14, I	A geocoding field designed t optimize matches between th data and tabular real estate management records. This fie differs from the GEOGLOT field in that forty code values for records that represent government lots are expresse as zero. When using this field to match with land records, care should be taken to ensur that forty codes in governme lot records are treated identically. An ARCVIEW to has been developed to automate this process--contac Tim Loesch at tim.loesch@dnr.state.mn.us.
GEOPARC	143	16, 16, I	REDEFINEd
GEOGLOT	143	14, 14, I	REDEFINEd
GEOFORT	143	12, 12, I	REDEFINEd
GEOSECT	143	10, 10, I	REDEFINEd
GEORANG	143	8, 8, I	REDEFINEd
RANG.DIR	149	3, 3, I	REDEFINEd

6

DNR Land Ownership



- Lite Metadata - - Get Data - - View Attribute Table - - View Sample -

Minnesota DNR - MIS Bureau

DNR Land Ownership

This page last update: 02/10/2000 3:08:26 PM
metadata created using Minnesota Geographic Metadata Guidelines .

Go to Section:

Section 1	*Identification Information - - - - - - top*
Originator	Minnesota DNR - MIS Bureau
Title	DNR Land Ownership
System Name	lndowrg3
Abstract	DNR land ownership and administrative interest mapped to the PLS forty level. This layer merges the DNR Control Point Generated PLS layer with IBM mainframe-based land records. Data are organized by adminstrative unit (forestry, wildlife, parks, etc.) with assignments to ARC/INFO region subclasses that can be loaded directly into ARCVIEW as individual themes. The data are limited to a forty level resolution. Therefore, holdings that are less than a forty in extent are represented as a full forty in the data (although specific fields exist within the attribute tables that allow the user to identify these).
Purpose	To provide Minnesota DNR resource managers and land records specialists access to DNR land records information in GIS format.
Time Period of Content Date	1/21/1999
Currentness Reference	Land record information is current as of 1/21/1999 (at the time of this writing). Updates will follow first monthly and then weekly. PLS forty base information dates range from 1998 vintage modern surveys to survey notes from the late 1800s.
Progress	In Progress
Maintenance and Update Frequency	Monthly
Spatial Extent of Data	Northern Minnesota is complete, except Cook and Itasca Counties. North-central and extreme southern Minnesota are complete. South-central Minnesota and the metro area are not complete.
Bounding Coordinates	E = -89 W = -97.5

	N = 49.5 S = 43
Place Keywords	Minnesota
Theme Keywords	land ownership, public land survey, PLS, land stewardship, natural resources
Theme Keyword Thesaurus	None
Access Constraints	unrestricted
Use Constraints	Internal DNR use is unrestricted. External use is constrained by the standard, general DNR GIS Data License Agreement
Contact Person Information	Robert Maki, GIS Database Coordinator DNR-MIS 500 Lafayette Road St. Paul, MN 55155-4011 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Browse Graphic File Name	lndowrg3_sam.gif
Browse Graphic File Description	Not Applicable
Associated Data Sets	This data is derived in part from pls40ne3, and has coordinate coincidence with that coverage. The pls40ne3 coverage is closely related to the Minnesota Control Point Inventory (CPI)
Section 2	*Data Quality Information - - - - - - top*
Attribute Accuracy	Attribute accuracy is unknown, although record matching rates between the AS/400 ownership data and the PLS40 base generally exceeds 99 percent. Correctness of the matched records has not been quantitatively investigated.
Logical Consistency	Data are topologically consistent using ARC/INFO 7.2.1
Completeness	Data are exhaustive within those geographic areas covered, although statewide coverage is not yet available. Only those forties on which DNR has a land interest are included.
Horizontal Positional Accuracy	Horizontal position accuracy is consistent with pls40ne3. Users can expect an accuracy of +/- 50 feet although higher postional accuracy is achieved in many areas.
Vertical Positional Accuracy	Not Applicable
Lineage	The pls40ne3 layer on which this data set is based is documented elsewhere in the metadata system and a description of its lineage will not be repeated here. The land records information originates in an IBM AS/400 DB2 environment. Selected logical tables are downloaded using either an IBM-NT Client Access query (to fixed text format), and FTP transferred (to UNIX); or via a native DB2 AS/400 query and direct FTP transfer (to UNIX). The resulting fixed format text files are subjected to a record parsing process and loaded into INFO. Data are processed county by county, by augmenting the pls40ne3 data with a set of county-based land records tables containing land ownership information,

records of contract and easement activity, adminstrative unit descriptions, and land project names. Care was taken to preserve the complex cardinality that exists between the land records and PLS base data. The extended PLS40 data are then used as a basis for generating lndowrg3. The first step in the layer creation process is to eliminate all forties that do not hold DNR land information. The process to create the various administrator-based subclasses begins with the ARC REGIONQUERY command. This command, although adept at establishing multi-part polygons (regions) in a subclass, is incapable of generating multiple occurences of a forty within the subclass: a requirement for maintaining the integrity of DNR land records. To correct this deficiency, the source land table was automatically reviewed for records that were not properly incorporated. A list was then generated that was used to automatically add the missing features to the correct region subclass in arcedit.

Source Scale Denominator	24000

Section 3 *Spatial Data Organization Information - - - - - - top*

Native Data Set Environment	Arc/Info 7.x
Geographic Reference for Tabular Data	Not Applicable
Spatial Object Type	Vector
Vendor Specific Object Types	Poly
Tiling Scheme	County

Section 4 *Spatial Reference Information - - - - - - top*

Horizontal Coordinate Scheme	UTM
Ellipsoid	GRS1980
Horizontal Datum	NAD83
Horizontal Units	meters
Distance Resolution	meters
Altitude Datum	n/a
Altitude Units	n/a
Depth Datum	n/a
Depth Units	n/a
Cell Width	0
Cell Height	0
Latitude Resolution	0
Longitude Resolution	0

UTM Zone Number	15
SPCS Zone Identifier	0
County Coordinate Zone Identifier	0
Coordinate Offsets or Adjustments	n/a
Map Projection Name	n/a
Map Projection Parameters	n/a
Other Coordinate System's Definition	n/a

Section 5 *Entity and Attribute Information - - - - - - top*

Entity and Attribute Overview	DNR land record information organized by administrative unit, including fields that store: Land records sequence number; A full PLS description to the government lot level; Administrator code; Administrator Long Name; DNR Program ID; Internal DNR Project code; DNR Project Long Name; Number of acres owned within the mapped forty for a particular project; Percent of the forty that the project occupies; Interest of Acquisition; Land Type; Means of Acquisition; Year that the record was introduced or changed; Month that the record was introduced or changed; Day that the record was introduced or changed; Water orientation
Entity and Attribute Detailed Citation	None

HTML Table

Section 6 *Distribution Information - - - - - - top*

Publisher	Minnesota DNR - MIS Bureau
Publication Date	1/27/1999
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR 500 Lafayette Road, Box 11 St. Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Distributor's Data Set Identifier	lndowrg3
Distribution Liability	None stated
Transfer Format Name	7.1.2
Transfer Format Version Number	ARC/INFO

Transfer Size	171
Ordering Instructions	Contact above Person
Online Linkage	DNR Data Deli

Section 7	*Metadata Reference Information* - - - - - - *top*
Metadata Date	1/27/1999
Contact Person Information	Robert Maki, GIS Database Coordinator Minnesota DNR - MIS Bureau 500 Lafayette Road Saint Paul, MN 55155 Phone: (651) 297-2329 FAX: (651) 297-4946 E-mail: robert.maki@dnr.state.mn.us
Metadata Standard Name	Minnesota Geographic Metadata Guidelines
Metadata Standard Version	1.1
Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

DNR Land Ownership

Table Name	Field Name	Begin Column	Definition	Valid Values	Description
lndowrg3.pat(administrative name)					ARC/INFO Regions attribute table. There are seven region subclasses, each with identically formatted tables. These are forestry, parks, trails, ecoserv, fisheries, wildlife, general (a miscellaneous category), county (tax forfeit)
	LSEQKY	25	7, 7, I		Land records sequence number, a key back to the AS/400 land table
	GLOTMATCH	32	14, 14, I		A full PLS description to government lot
	LADMIN	46	2, 2, I		Administrator code
				1	DEPT OF NATURAL RESOURCES
				30	FISH
				41	FORESTRY DIVISION
				43	PARKS
				62	TRAILS
				80	COUNTY: MISCELLANEOUS
				81	COUNTY: FOREST
	ADM_NAME	48	20, 20, C		Administrator Long Name, The long name as defined i the LADMIN field
	LMGPGM	68	3, 3, C		DNR Program
				CBR	Canoe and Boating Route
				DNR	DNR Unit
				FMA	Fish Management Area
				NPB	Native Prairie Bank
				SFT	State Forest
				SNA	Scientific and Natural Area
				SPK	State Park
				SRA	State Recreation Area
				SWS	State Wayside
				TRA	TRAIL
				WAS	Water Access Site
				WMA	Wildlife Management Area
				WPO	Wildlife Project: Other

			WSR	Wild and Scenic River
			MIN	Minerals Project
			WAT	Division of Waters Project
			FOR	Division of Forestry Projec
			AMA	Acquatic Management Are
			COW	Combined CBR/WSR
			EED	Environmental Education
			ENF	Enforcement
LMGPRJ	71	6, 6, C		Internal DNR Project code (creates unit ID with LMGPGM)
PRJ_NAME	77	25, 25, C		DNR Project Long Name (ususally without Program Name)
LACRES	102	6, 6, N, 2		Number of acres owned within the mapped forty fo a particular project
LPCT40	108	3, 3, I		Percent of the forty that the project occupies
LINTAQ	111	1, 1, C		Interest of Acquisition
			E	
			F	Fee
LLNDTP	112	1, 1, C		Land Type (1-9 are various categories of trust fund land)
			A	Acquired
			C	Consolidated Conservation
			O	Other
			R	Rural Credit
			V	Volstead Act
			T	Tax Forfeit
			1	School (Trust Fund)
			2	Independent School (Trust Fund)
			3	Swamp (Trust Fund)
			4	Internal Imp (Trust Fund)
			5	University (Trust Fund)
			6	Transferred University (Trust Fund)
			7	Trans. School (Trust Fund)
			8	Agricultural School (Trust Fund)
			9	Public Building (Trust Fund)
LMNSAQ	113	1, 1, C		Means of Acquisition

				B	County Board
				C	Condemnation
				D	Rural Credit
				E	Exchange
				F	Forfeited property tax
				G	Gift
				O	other
				P	Purchase
				R	Revision
				S	State Transfer
				U	Cong. Grant, Patent/Deed
				1	Sev. Mineral Forfeit
				2	Sev. Mineral Forfeit Non Registered Minerals
	LYRCHG	114	4, 4, I		Year that the record was introduced or changed
	LMNCHG	118	2, 2, I		Month that the record was introduced or changed
	LDYCHG	120	2, 2, I		Day that the record was introduced or changed
	LWATER	122	1, 1, C		Water orientation
				C	Covered by Water
				I	Island or Part of Island
				M	Meandered Lake
				N	Non-Meandered Lake
				O	Non-Meanandered Point of Meandered Lake
				U	Unknown
				0	None
				1	Meandered River
				2	Non-Meandered River, NI Stream or Drainage Ditch
				3	Pond or Marsh (10 + acres)
				4	Pond or Marsh (< 10 acres)
				5	Intermittent Stream or Creek
	PGM_PRJ	123	9, 9, C		Combination of LMGPGM and LMGPRJ
lndowrg3.pat					ARC/INFO Polygon Attribute Table
	COUN	25	2, 2, I		Two digit County Code
				1-87	Presented as part of the Hybrid County Boundaries layer description

TOWN	27	3, 3, I		Three digit township (tier) number
			26-71, 101-168	discreet values
RDIR	30	1, 1, I		Range direction
			0	West
			1	East (Cook County only)
			2	Township 58 1/2 (St. Louis Co.) and Range 42 1/2 (Roseau Co.)
RANG	31	2, 2, I		Two digit range number
			1-51	Numbers 3 to 27 are used for both the 4th and 5th principle meridians, while numbers 1 to 7 exist both east and west of the 4th principle meridian.
SECT	33	2, 2, I		PLS section number
			1-36	
FORT	35	2, 2, I		A combination of a code fo thc quarter section and a code for the quarter of the quarter section:
			0	Meandered water body
			11	NENE
			12	NWNE
			13	SWNE
			14	SENE
			21	NENW
			22	NWNW
			23	SWNW
			24	SENW
			31	NESW
			32	NWSW
			33	SWSW
			34	SESW
			41	NESE
			42	NWSE
			43	SWSE
			44	SESE
			1-10, 15, 16, 45, 46,	Used for specifying government lots that exist outside of the boundaries o the standard section within the forty field. See page 3 o the full Public Land Survey

			51-58, 61-68, 71-78, 81-88, 91-98	Geocoding Standard (available through Jill Christianson, Division of Minerals-Central Office) fo a complete description of the rules used to specify government lots in this field.
GLOT	37	2, 2, I		Two digit government lot ID (unique within each section)
			1-98	Government lot ID
			99	Meandered water body
PARC	39	2, 2, I		Two digit parcel code used to uniquely identify multiple parcels within forties and government lots
GLOTMATCH	41	14, 14, I		A geocoding field designed to optimize matches between this data and tabular real estate management records. This field differs from the GEOGLOT field in that forty code values for records that represent government lots are expressed as zero. When using this field to match with land records, care should be taken to ensure that forty codes in government lot records are treated identically. An ARCVIEW tool has been developed to automate this process--contact Tim Loesch at tim.loesch@dnr.state.mn.u
GEOPARC	25	16, 16, I		REDEFINEd on column 25 A composite identifier uniquely identifying each ownership parcel.
GEOGLOT	25	14, 14, I		REDEFINEd on column 25 A composite identifier that uniquely defines a portion of land to the government lot level.
GEOFORT	25	12, 12, I		REDEFINEd on column 25 A composite identifier that uniquely defines a portion of land to the forty acre level (1/4-1/4 section)..

GEOSECT	25	10, 10, I	REDEFINEd on column 25 A composite identifier that uniquely defines a portion of land to the section level.
GEORANG	25	8, 8, I	REDEFINEd on column 25 A composite identifier that uniquely defines a portion of land to the township-range.
RANG.DIR	30	3, 3, I	REDEFINEd on column 30 A combination of range number and range direction

Sociodemographic

The U.S. Bureau of the Census provides a wealth of information about the make-up of Minnesota's population and about patterns in the state's social and economic characteristics. This data is particularly useful for analyzing geographic areas, such as political jurisdictions, school and legislative districts.

CENSUS DATA

Census data can be organized into two main categories: 1) information about the location and shape of areas; such as counties, tracts and blocks, and 2) information about demographic and economic characteristics of those areas; such as population, housing and income. These two categories may be thought of as 1) *census geography* and 2) *census statistics.*

Within a state, the U.S. Bureau of the Census delineates four units of census geography: *counties* are divided into *census tracts,* which are made up of *block groups.* Block groups are further subdivided into individual *blocks* (see diagram on page 14). All census geography areas lie completely within a single county.

A different type of area, the minor civil division, is often related to census geography. In Minnesota, MCDs refer to townships and cities. They can cross county boundaries and can contain a number of census blocks, block groups and, if large enough, census tracts.

The U.S. Bureau of the Census provides a single vector data set composed of a variety of geographic features — roads, streams, railroads — together with boundaries for all census geography areas. That collection is called a TIGER/Line file. TIGER stands for topologically integrated geographic encoding and referencing.

Although filled with an assortment of valuable information, TIGER/Line files are quite large and can be difficult to work with. As a convenience to GIS users, Minnesota's Legislative GIS Office and the Land Management Information Center have refined the TIGER/Line files prepared for the 1990 decennial census by creating separate data files for each level of census geography. In addition, files for MCDs, school districts and legislative and congressional districts within Minnesota are also available.

Below are descriptions of census geography data separated by area, TIGER/Line files and sources for census statistics. For information on raster versions of census geography, see page 18.

Census Geography - Separated by Area

Source: 1990 U.S. Bureau of the Census TIGER/Line files processed by the Minnesota Legislative GIS Office
State coverage: Full
Format: ARC/INFO export

1990 County Boundaries
File unit: State
Price: No charge via ftp://ftp.lmic.state.mn.us/pub

1990 Tracts
File unit: State
Price: $95

1990 Block Groups
File unit: State
Price: $95

1990 Blocks
File unit: County
Price: $95 for first unit; $5 for each additional unit

1990 Minor Civil Divisions
MCD is available in two versions: with or without county boundaries. *Note: The county boundary version is required to match 1990 census statistics.*

File unit: State
Price: $95

1990 or 1997 School Districts
Note: The 1990 version is required to match 1990 census statistics.

File unit: State
Price: $95

1994 Legislative and Congressional Districts
File unit: State
Price: No charge via ftp://www.commissions.leg.state.mn.us/pub/gis

Census Geography - TIGER/Line Files

A TIGER/Line file is a *single layer* that contains lines for all census data collection areas. Lines are assigned codes that indicate the type of boundary or boundaries they represent and the type of feature they portray. For example, a single line could be coded as a county and census tract boundary, and also as a river. Using these line codes, GIS users can select features they want to analyze.

The census distributes these files in TIGER format, and publishes a Data Users' Guide that explains format and translates codes. Although line files can be complicated, they are sometimes the only source for geocode address information. *Note: Many areas, particularly rural parts of the state, do not have complete address information.*

Private vendors may also be a valuable alternate source for this data since many of them have repackaged the data to make it easier to use.

Source: U.S. Geological Survey quadrangles, census DIME files, field transcriptions
Scale: 1:100,000 and various
State coverage: Full
Format: TIGER/Line
File unit: County
Distributor: U.S. Bureau of the Census Customer Services Office, http://www.census.gov or 301-457-4100

The Land Management Information Center distributes a version of the data set described above in ARC/INFO format that includes 1992 file updates and corrections, primarily additional address range information. The U.S. Bureau of the Census has prepared more recent updates, but these have not been incorporated into LMIC files.

Source: U.S. Geological Survey quadrangles, census DIME files, field transcriptions
Scale: 1:100,000 and various
State coverage: Full
Format: ARC/INFO export
File unit: County
Price: $95 for first unit, $15 for each additional unit

Census Statistics

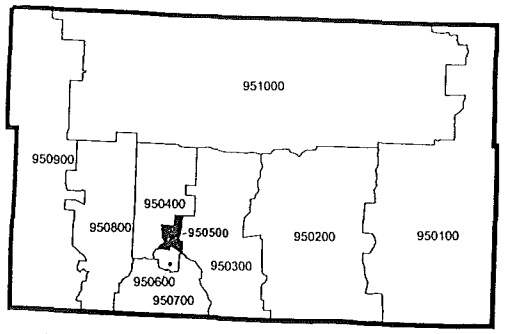
The Land Management Information Center's DATANET system provides online viewing and downloading of selected census statistics. See page 19 for more information.

The U.S. Bureau of the Census Customer Services Office provides a wide range of census products and maintains a list of private vendors who have repackaged census data at http://www.census.gov or 301-457-4100.

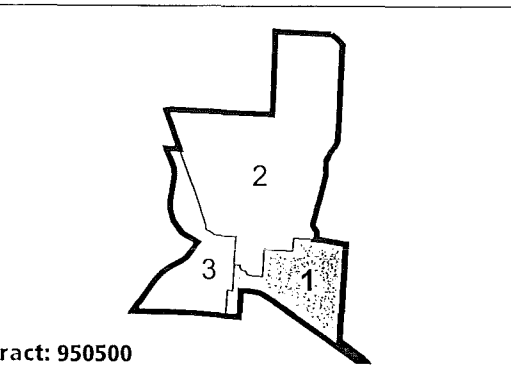
Another valuable source of census information is the University of Minnesota's Machine Readable Data Center. The center is a coordinating member of the Minnesota State Data Center and serves as the tape depository for that network. Located on the University's Minneapolis campus, the center provides assistance in using its extensive collection, as well as customized consulting on a fee-for-service basis. It is open to the general public. For more information, contact the center at mrdc@mrdc.lib.umn.edu or 612-624-4389.

HIERARCHY OF CENSUS GEOGRAPHY

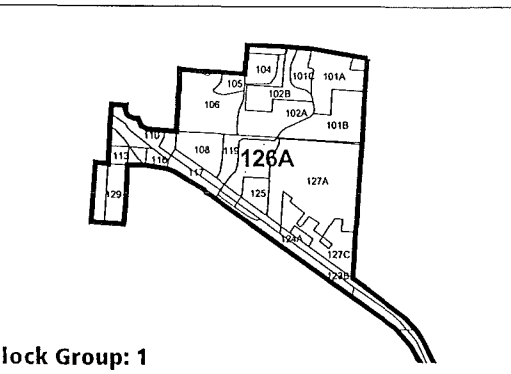
Census statistics are collected and aggregated at four levels: county, census tract, block group and block.



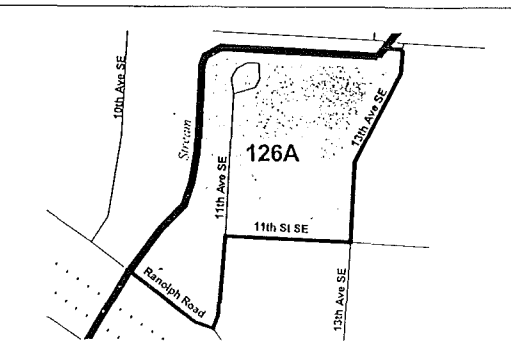
County: 005



Tract: 950500



Block Group: 1



Block: 126A

Minnesota Planning is a state agency charged with developing a long-range plan for the state, stimulating public participation in Minnesota's future and coordinating public policy among all levels of government.

The Land Management Information Center at Minnesota Planning assists state and local government to effectively use geographic information in public policy-making and operations. To fulfill this mission in part, LMIC provides public access to the databases listed in the *Minnesota Geographic Data Catalog 1998*.

The Land Management Information Center's homepage on the World Wide Web is http://www.lmic.state.mn.us. The site links to the data catalog, as well as to available data set documentation and status maps, information about DATANET, EPPL7, documentation standards and the Minnesota Governor's Council on Geographic Information.

Upon request, the *Minnesota Geographic Data Catalog 1998* will be made available in an alternative format, such as Braille, large print or audio tape. For TTY, contact Minnesota Relay Service at (800) 627-3529 and ask for Minnesota Planning.

May 1998

For more information, paper or electronic copies of the *Minnesota Geographic Data Catalog 1998*, contact:

MINNESOTA PLANNING LAND MANAGEMENT INFORMATION CENTER

658 Cedar St.
St. Paul, MN 55155
612-296-1211
Fax 612-296-1212
http://www.lmic.state.mn.us

U.S. Census Bureau

Cartographic Boundary Files

Select a page from one of the following menus...

Boundary Files... Go!

Metadata... Go!

Technical Information... Go!

Site Information... Go!

Other U.S. Census Bureau Sites... Go!

Census Block Group Cartographic Boundary File Me

Title	1990 Block Groups
Format	ARC/INFO .e00, Arcv ARC/INFO Ungenera
Description	1990 Block Group by (FIPS) in zipped ARC and/or Arcview shape
Location	http://www.census.go
Distributor	Department of Comm Geography Division
System	Geography extracted Bureau's TIGER data ARC/INFO coverage converted to ARC/IN an Arcview Shapefile
Originator	Department of Comm Geography Division
Scale Denominator	5,000,000
Place_Keyword	Block Group
West_Bounding_Coordinate	172.46087
East_Bounding_Coordinate	-65.2215271
North_Bounding_Coordinate	71.34294128
South_Bounding_Coordinate	17.88511467
ARC/INFO Export Projection	Geographic (Lat/Lon
Arcview Shapefile Projection	Geographic (Lat/Lon
ARC/INFO Generate (ASCII) Projection	Geographic (Lat/Lon
Datum	NAD27
Vintage	1/1/90

Last Revised: Feb 01 2000 · boundary_files@geo.census.gov· Geography Division · US Census Bureau · (301) 457-1101

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